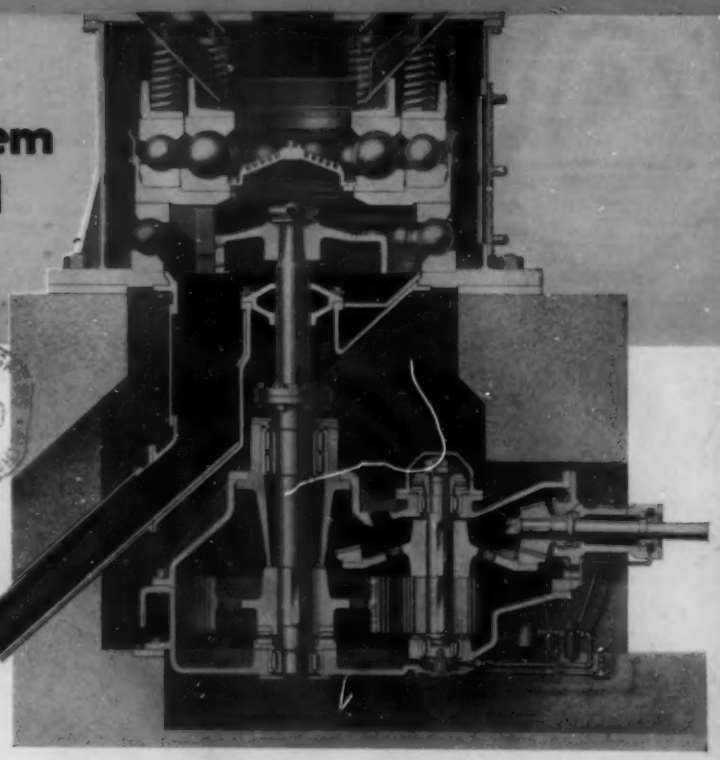
Rock Products

THE INDUSTRY'S RECOGNIZED AUTHORITY

DECEMBER, 1940

B&W
Closed-Circuit System
***for* Raw Material**
and
Clinker Grinding



New

Gravity Discharge

Reduced power consumption and lower maintenance charges are features of the improved B&W Closed-Circuit System. The new design eliminates the sweep. Pulverized material from the grinding zone is now discharged by gravity.

Write for a description of the B&W Closed-Circuit System with improved gravity discharge.

THE BABCOCK & WILCOX COMPANY . . 85 LIBERTY ST., N. Y.

C-36

LUDLOW-SAYLOR

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

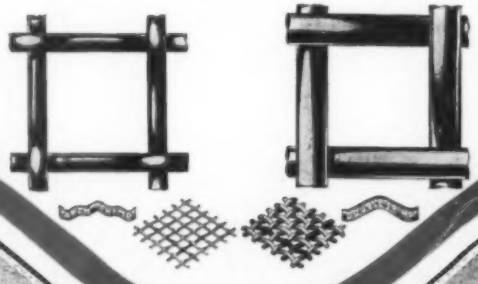
for super-severe service

●

SUPER-HARD, SUPER-TOUGH, SUPER-STRONG

CONTROLLED-TEMPER SUPER-LOY WOVEN WIRE SCREENS

withstand abrasion longer—
endure vibration better—
resist fatigue to the utmost



The background at top of page shows the "Perfect" Double-Crimp Weave.

The small cuts in the center panel compare Arch-Crimp Weave and Double-Crimp Weave.

The border at foot of page shows "Perfect" Double-Crimp Steel Wire Cloth which has been hot-dip galvanized after weaving.

Samples on request.

The LUDLOW-SAYLOR WIRE COMPANY
SAINT LOUIS

How HERCOMITE

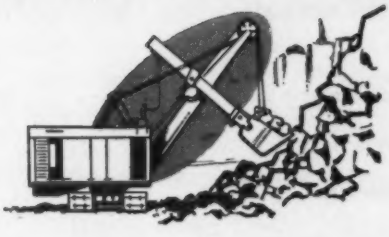
became the Standard Explosive for

QUARRYING

1. THIS STORY begins with Hercules undertaking research to provide quarrymen with an explosive combining safety, economy, and efficiency.

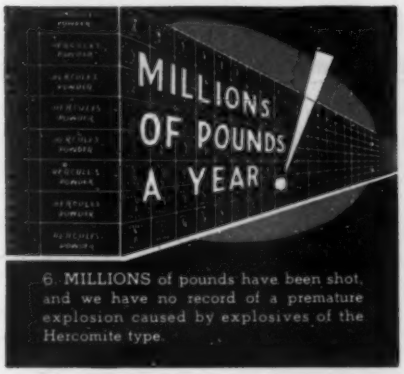
2. THE RESULT was the development of the *first* economical ammonium nitrate explosive suitable for quarry blasting.

3. RAPID refinements then brought the Hercomites* 2 to 7 (240 to 350 cartridges per 100 lbs.), and Hercomite bag powder.



4. THE WIDE RANGE of bulk strengths of the Hercomites filled the operators' need for good breakage at low cost in all kinds of rock.

5. OPERATORS were enthusiastic as Hercomite demonstrated an average saving of 15% in blasting costs, and better breakage, too.



6. MILLIONS of pounds have been shot, and we have no record of a premature explosion caused by explosives of the Hercomite type.

7. TODAY, as a result of this pioneering and research by Hercules, the Hercomites are the standard explosives for quarrying.

HERCULES POWDER COMPANY
Incorporated

KING STREET · WILMINGTON, DELAWARE

D-11

DEC 12 1940 ©CIB 479294

NEXT MONTH'S ISSUE

● National Defense is rapidly becoming the major motivating force in all business, and the rock products industries are expected to take an important part in the program.

In keeping with this trend, the January Annual Review Issue of ROCK PRODUCTS will have as its theme the subject, "National Defense Problems Facing the Rock Products Industries." Producers of cement, sand and gravel, and crushed stone are already confronted with difficulties in securing certain classes of machinery and steel, and the question of shipping priorities for its products is a subject which is giving concern to many executives.

These problems and methods of meeting the situation will be the subject of several interesting articles based on information obtained from a nation-wide survey in all branches of the industry. While no mention may be made of individual companies, the reports will show which areas are receiving defense orders and the relative proportion of the business which may be placed in this category.

● Specific articles will show how cement companies are meeting the problem of rush orders for airports, fortifications, and defense plants, and the specifications required for these projects. Illustrations will show the various types of sand and gravel and crushed stone aggregates required. Specifications of this material and ready mixed concrete will be given as a guide for other companies which eventually will be called upon to serve defense projects.

● Other articles will deal with the production of mica, potash, fluorspar, graphite and other minerals which heretofore have been imported from foreign lands to supplement domestic sources of supply. The production of these and other special minerals have been greatly stimulated by the difficulty of obtaining imports.

Concrete Products

● A very substantial increase in the use of concrete products is expected during the coming year with lumber prices going sky high. Many contractors now are building the all-concrete type of house at a price which compares favorably with frame construction. Methods of promoting the sale of concrete products in housing projects will be described in the coming issue. Some very helpful information concerning new types of concrete units also will be given.

● Ready mixed concrete is being used in enormous quantities for airports, and for new defense industry structures. Articles describing how ready mixed concrete companies are meeting this demand will be published.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 43, No. 12

Contents for December, 1940

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ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.

Impartial measurement of reader interest in terms of paid circulation.

Authentic facts relating to editorial scope and readership analysis.

(PUBLISHED MONTHLY AT CHICAGO, ILL., U. S. A.)

Entered as second-class matter, Jan. 30, 1936, at the Chicago, Ill., postoffice under the Act of March 3, 1879. Copyrighted, 1940, by Tradepress Publishing Corporation

Have You a Small Rock Products Plant
TOO SMALL FOR THE BIG, EXPENSIVE, SLOW SPEED DIESELS... YET WITH TOO TOUGH A JOB FOR THE LIGHT, HIGH SPEED ENGINES?

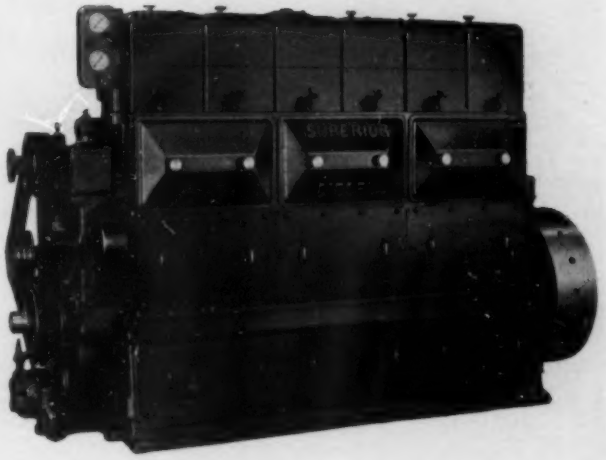
THEN *here is the new SUPERIOR Diesel you need...* It is a conventional, simple, 4-cycle engine any mechanic can understand.

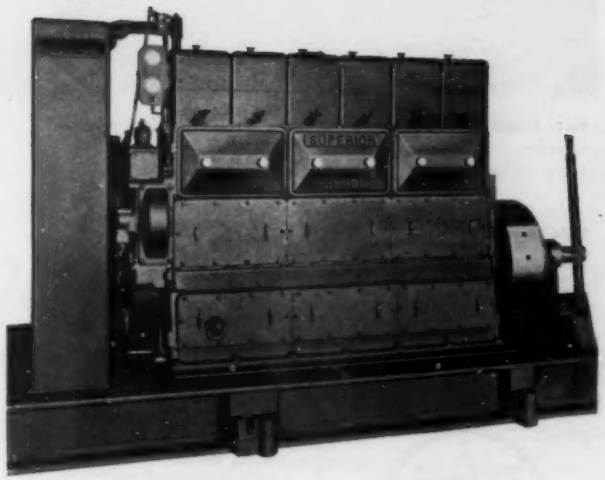
It is a sure-starting full Diesel that has no trick dual fuel systems, extra carburetors, heater plugs, or battery system to look after.

While it is not heavy and not too big to move to another job, it is not an over-rated "prima donna." It has a 6-inch diameter crankshaft with a strong, rigid bed under its crankshaft, not underslung bearing caps. It has pressure lubrication even to valve gear. It can use any good Diesel fuel, heavy or light... and economy!—even the best of the big engines can't beat it.

If you need about 200 to 375 honest horsepower, these engines have it. And, brother!—they can really take a bit of overload once in a while without costing you a month's income for an overhaul job.

Chances are one of these engines installed will cost you less than two or three light duty engines to do the same work but not so well.

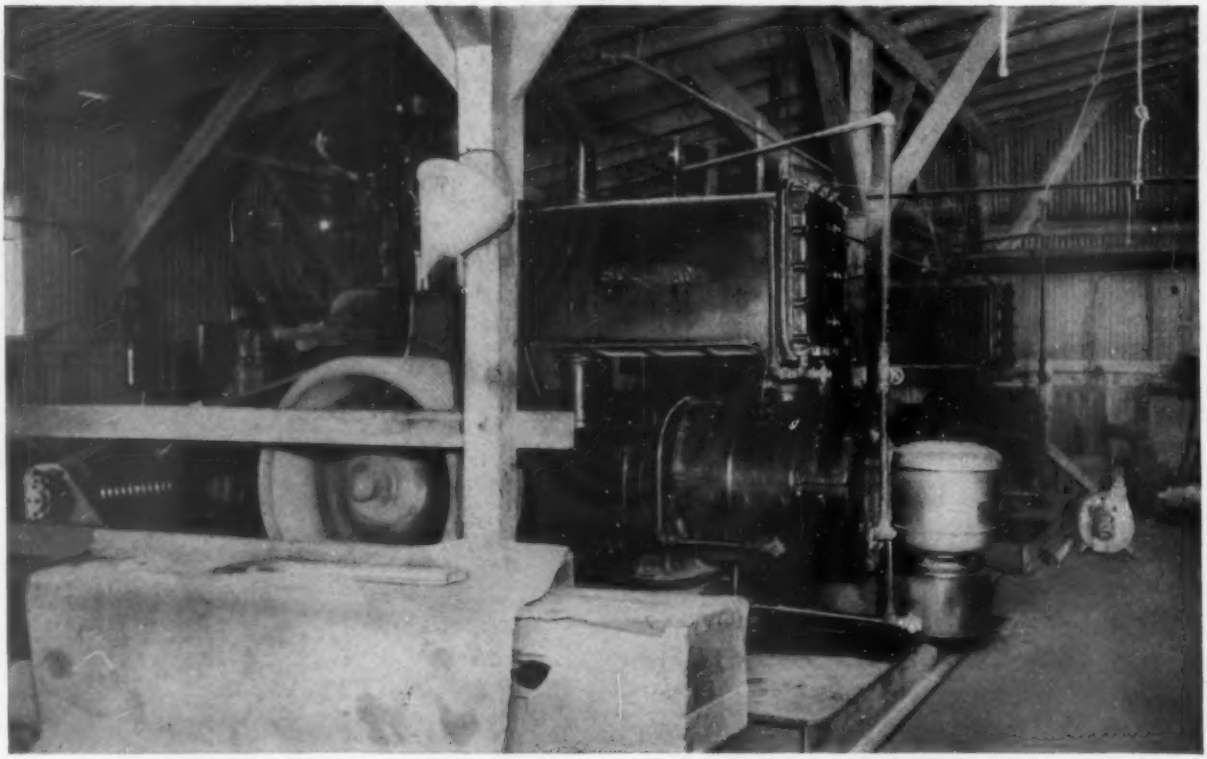




Don't think the big fellow is the only one who can enjoy Diesel Savings. Ask us about this new engine if it's the right size for you. It should pay for itself most anywhere power is used.

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
FACTORIES: Springfield, Ohio; Philadelphia, Pa. • SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Cal.; Jacksonville, Fla.; Houston, Texas

Valves Clean—PRESSURE UP!



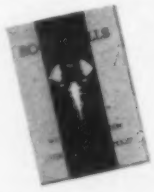
TWO SULLIVAN Compressors furnishing air for a big southwestern dam project. Active valves and clear ports result from exclusive use of *Texaco Algol Oil*.

TEXACO DEALERS INVITE YOU TO ENJOY

FRED ALLEN in a full-hour program every Wednesday night. CBS. 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.

METROPOLITAN OPERA every Saturday afternoon. NBC. See local newspaper for time and station.

TEXACO



ROCK DRILLS—a 36-page booklet of pictures and text to help you keep your rock drills on the job. Yours for the asking.

GIVING continuous, efficient performance, these Sullivan compressors operate at peak efficiency . . . deliver full pressure at low power cost. The lubricant responsible for keeping these compressors clean and effective . . . is *Texaco*.

Texaco Alcaid, Algol and *Ursa Oils* are highly stable and resist carbon formation. They keep valves operating properly, lines and ports clear, rings free.

Trained lubrication engineers will gladly cooperate in making savings with *Texaco Alcaid, Algol* or *Ursa Oils* in your compressors. Phone the nearest of more than 2300 Texaco warehousing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

TEXACO ALCAID, ALGOL, AND URSA OILS

A "Rubber Railroad"

10 MILES LONG!

—world's lowest-cost transportation system

THE great installation you see here is one of the world's most spectacular engineering feats — the longest conveyor belt transportation system ever built! Ten miles long in all, this giant "rubber railroad" is the main line for transporting construction supplies to the great Shasta Flood Control Dam. Designed by the G.T.M. —Goodyear Technical Man— it beelines across wastelands, bridges rivers, climbs over a range of hills 1,350 feet high, carrying a peak capacity load of 22,000 tons per day. In four years it will deliver 10,000,000 tons of sand, gravel and crushed stone—*at far lower cost per ton than any other haulage method!* This mammoth conveyor is the outgrowth of other historic installations ranging from one to five miles in length that have proved the unrivaled economy of belt transit in handling huge tonnages over terrain where other transportation does not exist or costs prohibitively. If you have such a problem, consult the G.T.M. Write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER
GOODYEAR

OPERATING COSTS CUT

THE ONLY PIECE OF NEW equipment the Koenig Coal & Supply Co. needed to cut the cost of gravel in half was the Allis-Chalmers Low-Head Screen . . . another example of how Allis-Chalmers cooperative engineering can help you save money.

Let Allis-Chalmers Cooperative Engineering help you cut your operating costs!

$17,500 PER YEAR!

Koenig Coal & Supply Co. Doubles Output . . . Cuts Costs of Production in Half! Find Out How You Can Save Money by Putting Allis-Chalmers Cooperative Engineering to Work for You to Select the RIGHT Equipment for the Job You Want Done!

WHEN THE FLOW sheet has to be changed to meet today's demand for finer aggregates . . . when large boulders crop up in the gravel bed . . . when power and maintenance costs start to soar . . . that's when a crushing plant needs real cooperative engineering to keep operating at a profit!

That's what John F. Koenig, president of the Koenig Coal & Supply Co., Detroit, was up against early in 1937. Production was dropping off. Four or five men had to be stationed at the crushers to work large boulders around so that feed could be increased. It looked as if a big investment in new equipment was needed. Then Mr. Koenig called in the Allis-Chalmers engineers!

Cut Costs in Half!

These engineers licked the problem. They stepped up the plant capacity to 244.7 tons per hour . . . nearly double the former output for the 1200 annual hours of operation. They cut the cost of gravel from 12 cents to 6 cents per ton . . . a total saving of $17,500 per year!

And that saving was effected . . . not with new equipment that would have meant thousands of dollars to Allis-Chalmers . . . but largely through modernizing the existing machines! The crushers were set closer, speeded up, and the throw increased. The old rotary screen was replaced with an Allis-Chalmers Low-Head Vibrating Screen to insure lower carryover to the crushers.

No wonder the Koenig Coal & Supply Co. recently bought an Allis-Chalmers tractor and scraper. They wanted to be sure they got the *right* equipment for the job they had to do . . . the combined experience, analysis, research and versatility that make Allis-Chalmers the largest manufacturers of rock and ore reduction machinery in the world.

The Right Machine for Your Job!

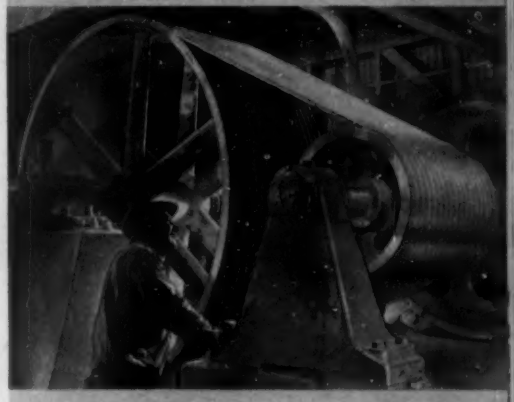
When you bring an inquiry to Allis-Chalmers, your needs are analyzed . . . you get an unbiased recommendation based on your particular needs. And the completeness of the Allis-Chalmers line guarantees you an unbiased recommendation for your job.

You'll want to know how Allis-Chalmers cooperative engineering can go to work for you! For complete information call the district office near you or write direct to Allis-Chalmers, Milwaukee, Wisconsin.

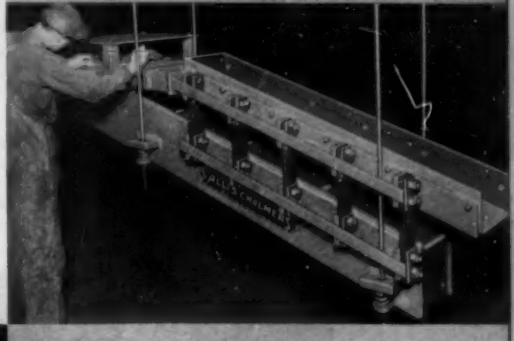
A 1251

News of other Allis-Chalmers Products that cut your costs!

A FINER PRODUCT . . . EASIER . . . at lower cost — that's what you get with the new, low-cost Type "R" Reduction Crusher. Here is a line of 322's for stock.



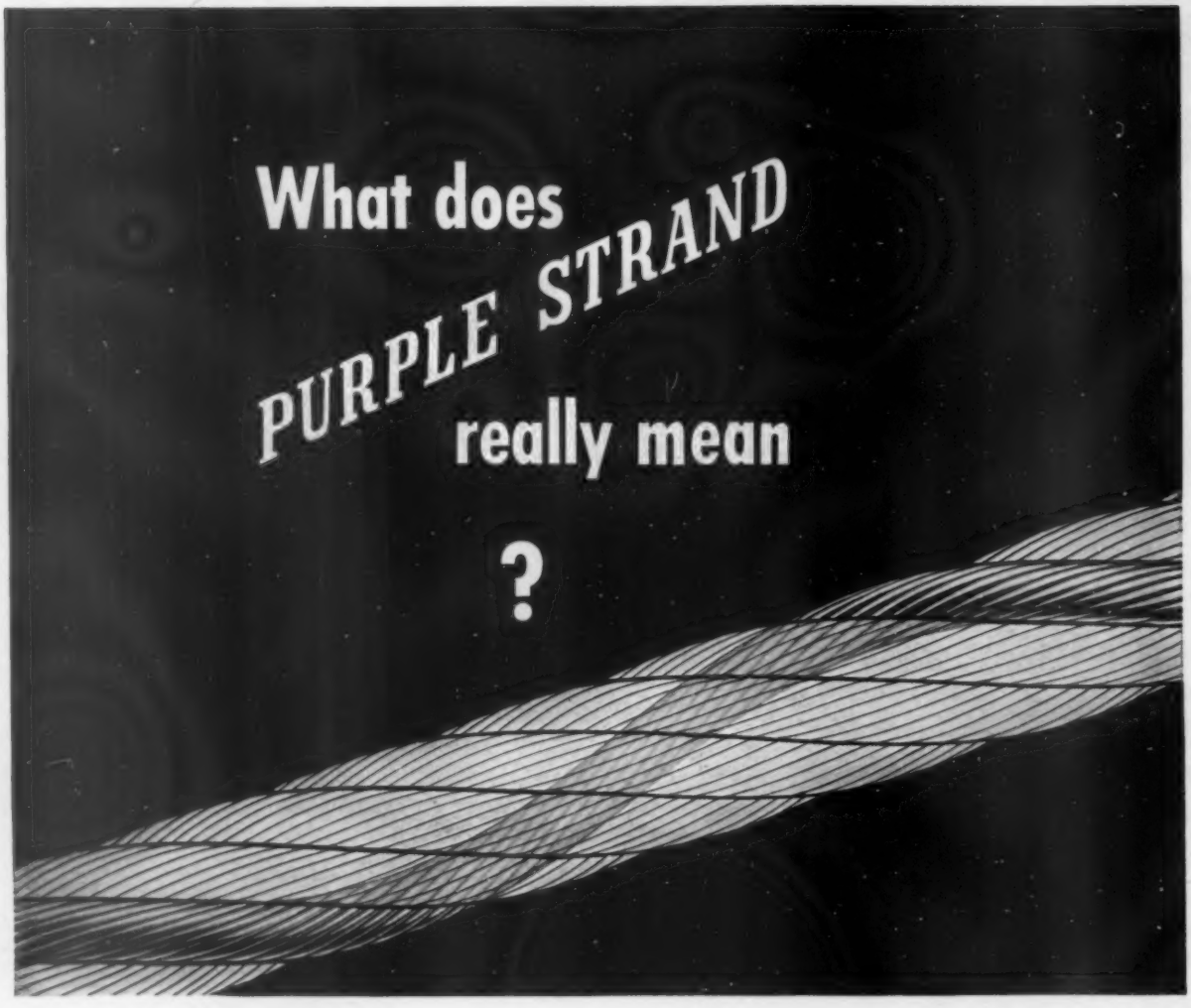
"STILL GOING STRONG AFTER ten years on the job!" — the case history of the 250 hp Allis-Chalmers Texrope Drive and Lo-Maintenance Motor powering a 60 ton tube mill in a midwestern quarry.



NEW, IMPROVED ALLIS-Chalmers Utah Electro-magnetic Vibrating Feeder gives stability of operation . . . increased over-all plant capacity. This 42"x 6"x 5'6" feeder handles 75 long tons of rock hourly.

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN



THE fact that we paint one strand of our top-grade rope with purple paint doesn't mean that we are partial to pretty colors. Far from it. That purple strand has the following dollars-and-cents meaning to every buyer of wire rope:

1. OUR BEST STEEL
—Only premium-priced Improved Plow Steel is used in the wires of Purple Strand rope. This steel costs more, but it is the toughest, strongest steel used in the wire-rope industry. Its quality is the direct result of fifty years experience in wire-rope making.

2. OUR BEST MEN
—The most experienced men in the Bethlehem rope mill run the Purple Strand machines. Rope designs are held to precision tolerances. Lay is carefully checked. Nothing is overlooked which can possibly contribute to the making of top-quality rope.

3. 3-WAY LUBRICATION
—Every foot of Purple Strand wire rope is lubricated three ways. The core, the wires, the strands are stuffed chock full of scientific lubricants. These lubricants fight rust, reduce wear, thereby guarding the strength of the rope and increasing service life.

Next time you need wire rope, try a length of Purple Strand. Match it against the best rope you've used. Then judge its quality for yourself. Purple Strand wire rope is available in all sizes in right, left or Lang Lay and with hemp center or IWRC.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Behind EVERY MARION
ARE THESE WELL KNOWN FACTS

● Ample power reserve and stamina for profitable performance in rock or ore.

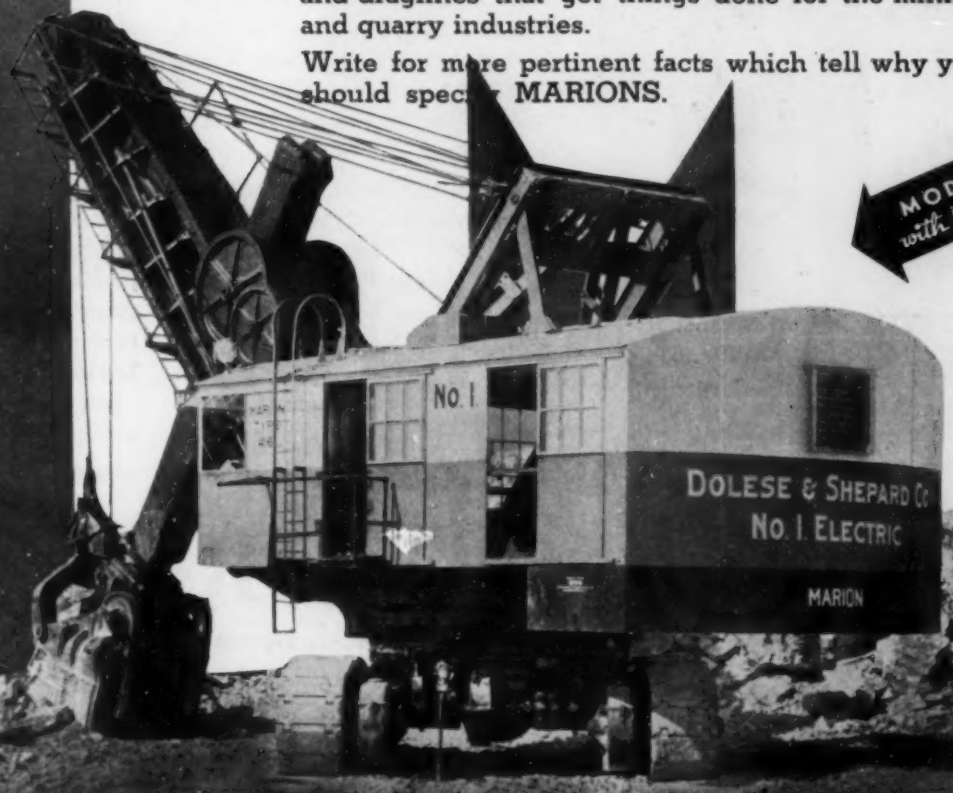
Plenty of speed and capacity to insure maximum yardage in the toughest digging.

Sturdy construction and well balanced design . . . most acceptable for low maintenance.

Long and wide crawlers for stability . . . that are positively self-cleaning, non-clogging and non-binding.

Almost 60 years of experience in building shovels and draglines that get things done for the mining and quarry industries.

Write for more pertinent facts which tell why you should specify MARIONS.



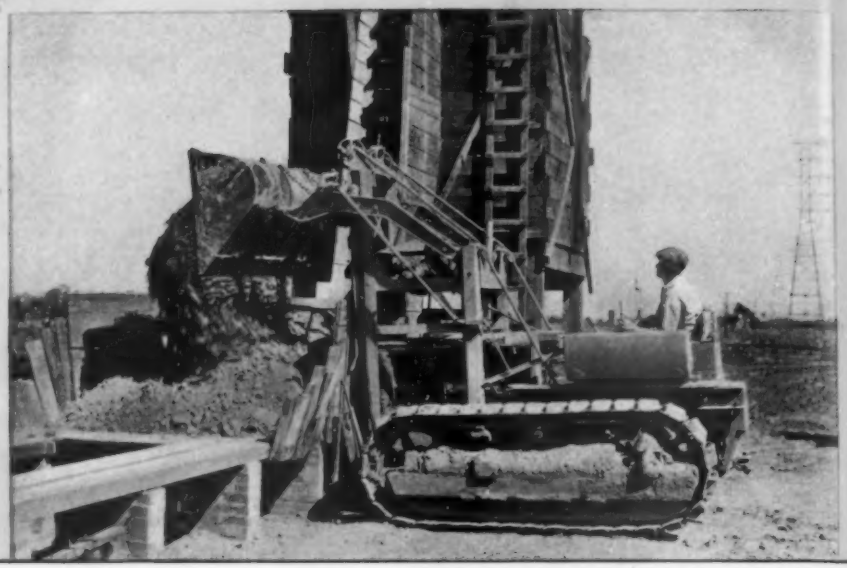
The MARION
STEAM SHOVEL COMPANY ● MARION, OHIO, U. S. A.

SHOVELS • DRAGLINES • CLAMSHELLS • CRANES
PULL-SHOVELS • WALKERS

From 3/4 Cu. Yd. to 35 Cu. Yds.
Gasoline - Diesel - Electric

Coast Brick Co., Los Angeles, California, owns this "Caterpillar" Diesel D4 Tractor with a Traxcavator. Handles brick clay and sand for burning in kilns. Loads material from stock pile to hopper, etc. Several sizes of these machines available. Low first cost!

Here's a lift for your loading



THE JOB of getting material loaded, moved or mixed doesn't cost what it used to . . . doesn't take as much time! And here's the outfit that's turned the trick. A "Caterpillar" Diesel Tractor equipped with a Traxcavator!

Rock. Sand. Gravel. Or name your own material. And say what you want done with it: Loaded into trucks. Piled in a new location. Fed into crushers. Mixed to specification. A "Caterpillar" Diesel with a Traxcavator can pick it up and lay it down —exactly where you want it!

Scoop. Lift. Carry. Dump. *That's* the routine of this rig. It can turn and work in close quarters. Shuttle from one stock pile to another. Move at a steady, time-saving speed. Take a generous yardage on every trip. *Use low-cost Diesel fuel in economical amounts!*

And don't forget that this is still a *tractor*. When it isn't at work on high-shoveling, it can turn-to on ripping, scraping, excavating, any pushing or pulling job that needs the power, low cost, and steady performance you get with a "Caterpillar" Diesel Tractor! See your nearest "Caterpillar" dealer, or write direct to the factory, for further information.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

Tobin Quarries, Inc., Canoga Park, California, owns this "Caterpillar" Diesel D4 Tractor with a Traxcavator. The rock is hauled to a damsite and spread by a "Caterpillar" Diesel D7 Tractor.

MY ADVICE IS . . .
USE EXCELLAY!
FROM THE DAILY REPORT OF A TIGER BRAND WIRE ROPE ENGINEER
I was just walking into Mr. Brown's office when one of his engineers called this morning.
"My advice to you," he said on the phone, "is use Excellay. No other rope can touch it. Next time the Tiger Brand Engineer comes in I'll have him see you. He's helped me out dozens of times."
Then he looked up and saw me "Well," he said, "speak of the devil and there he is." The three of us went over the specifications together, and decided that Brown was right -- Excellay will do the best all-round job.
Yours,
Jim

KNOWING wire rope from A to Z—how to choose it and how to use it—that's the job of the American Tiger Brand Wire Rope Engineers. It will pay you to make use of their specialized knowledge and experience, gained through years of practical service to wire rope users in every industry, everywhere.

These men do more than help you select the right rope for a given application. If for any reason you are not getting full performance, they can help you locate the trouble and suggest practical ways and means for eliminating the difficulty. Get to know the American Tiger Brand Wire Rope Engineer who contacts you. Discuss your wire rope problems with him. Get his advice on every wire rope specification.

He can help you get a full dollar's worth of performance out of every dollar you invest in wire rope.

EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

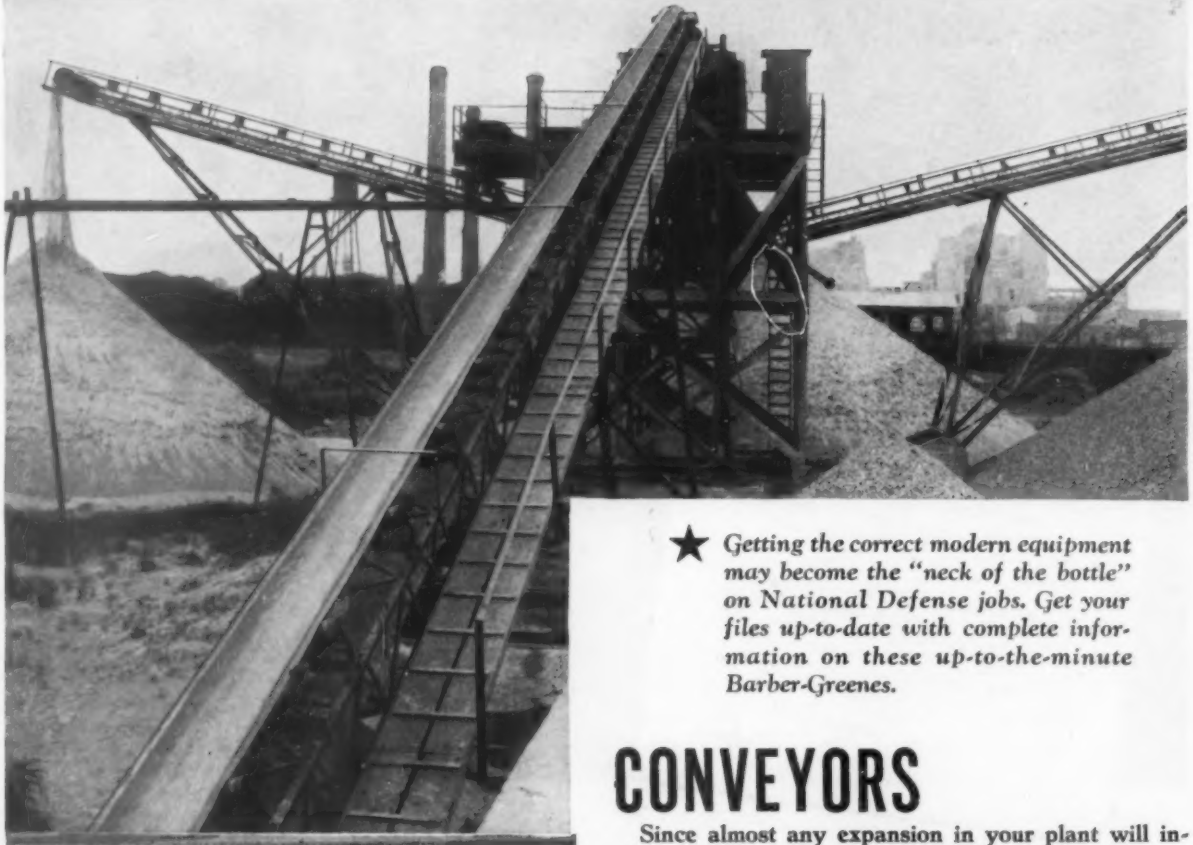
COLUMBIA STEEL COMPANY
San Francisco

United States Steel Export Company, New York

UNITED STATES STEEL

★ PREPARE

National Defense Awards with



★ *Getting the correct modern equipment may become the "neck of the bottle" on National Defense jobs. Get your files up-to-date with complete information on these up-to-the-minute Barber-Greenes.*

CONVEYORS

Since almost any expansion in your plant will include belt conveyors, you should have the 108 page Barber-Greene Belt Conveyor Catalog NOW to study the many conveyor applications, ideas, and engineering data. See how much Barber-Greene's Standardized Sectional Construction simplifies and speeds up delivery and erection. See how the B-G Standardized Factory-aligned Terminals assure dependable, trouble-free operation, and most important, see how Barber-Greenes are easily moved, rearranged, lengthened, shortened, or otherwise altered to meet future expansion or plant revision.

Many are taking advantage of Barber-Greene's experience and ingenuity in solving material handling, and plant layout problems. Phone, write, or wire for the Conveyor Catalog or engineering assistance. There is no obligation.

STANDARDIZED MATERIAL HANDLING MACHINES

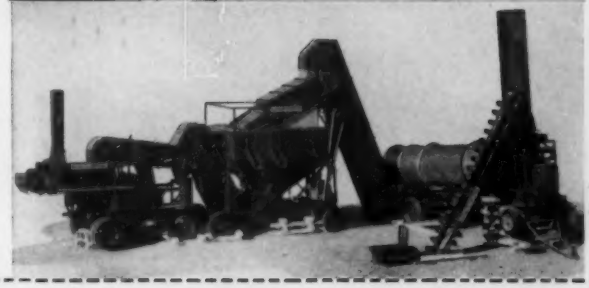
BARBER-G

YOURSELF for complete Barber-Greene Information

BUCKET LOADERS

Twenty years of proof stand behind the claim that the least expensive way to load is with Barber-Greene Bucket Loaders. Above right is the High Capacity Crawler Mounted Model 82-A. Also available is the smaller crawler mounted 552.

The Pneumatic Tired Mounted Model 522 (above left) has made bucket loader history. Available with low boom and swivel conveyor or with conventional high boom and spout as shown. It has proven to be not only the answer for the small operator, but ideal on small or scattered jobs in large plants.



BITUMINOUS PLANTS

The B-G Bituminous Mixer is available in a wide range of sizes including the small "Maintenance Plant." Available for single or multiple aggregates, with or without dryer.

Mail today . . . . .

Just clip this coupon to your letterhead and check the items on which you would like complete information. There is a booklet on each subject. No obligation.

☐ CONVEYORS PORTABLE ☐ LOADERS

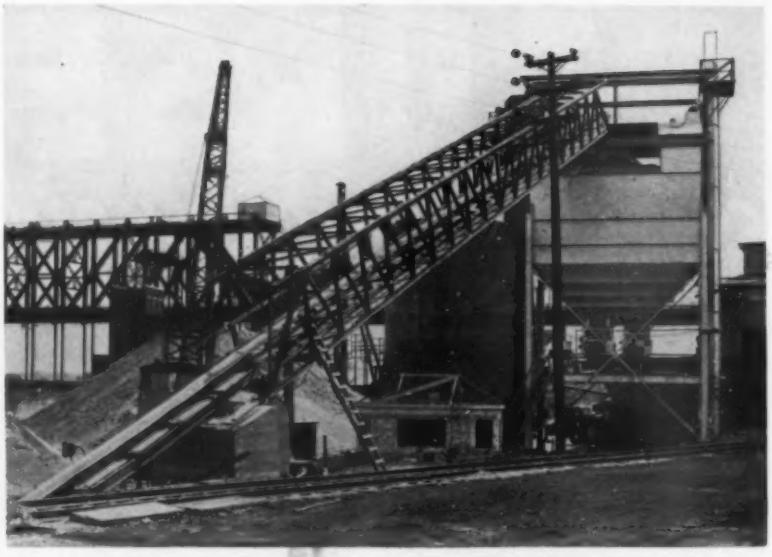
☐ CONVEYORS PERMANENT ☐ BITUMINOUS PLANTS

40-16 Barber-Greene Company, Aurora, Illinois

BARBER-GREENE

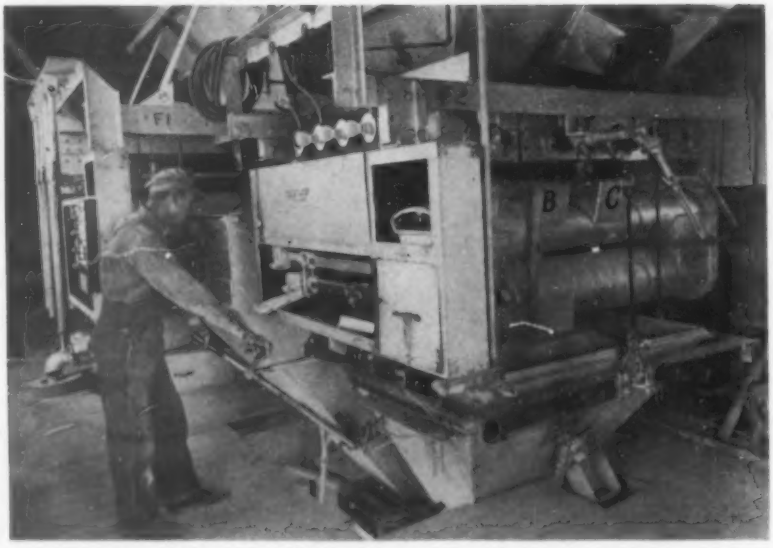
STANDARDIZED MATERIAL HANDLING MACHINES

DESIGN— That's the secret of Efficient operation



421 Cubic Yard, Seven Compartment Ready-Mixed Concrete Plant for four sizes of aggregate and three brands of cement owned by the Stewart Sand & Material Company of Kansas City, Missouri.

AND THAT'S WHY PLANT OPERATORS SPECIFY BUTLER BINS



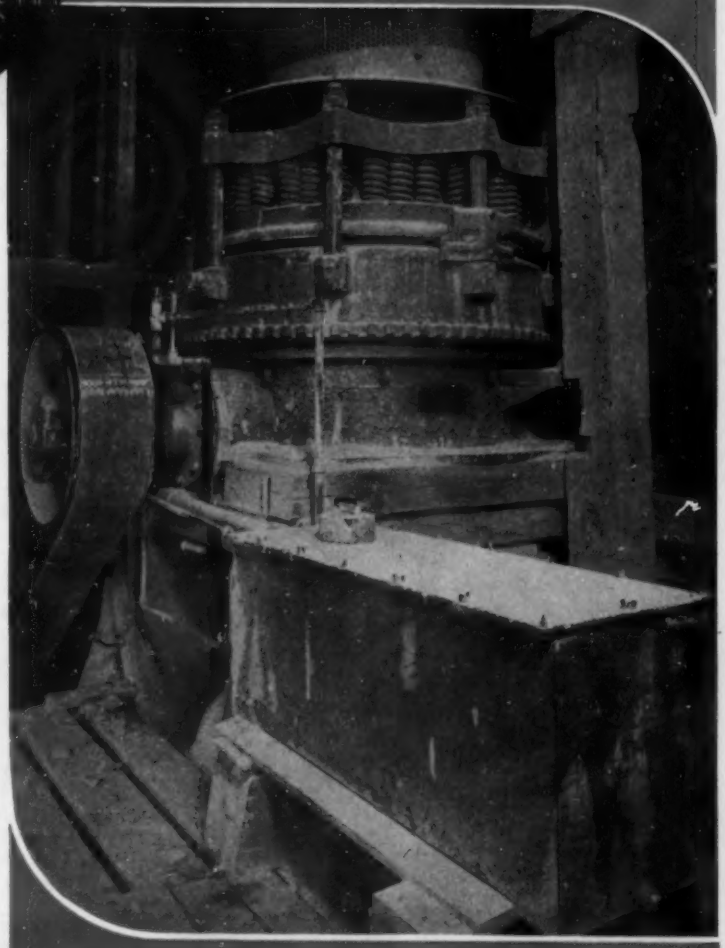
View of batching platform of above plant. Note automatic cement batcher, with discharge levers for both aggregate and cement within easy reach of the operator.

● When the Stewart Sand & Material Company decided to go into the ready-mixed concrete business, Mr. John Prince, president of the company, traveled all over the United States inspecting successful installations. It is not surprising that when he returned he called upon Butler engineers to lay out his plant. He had seen enough plants to know that the Butler Bin Company was fully equipped to design and build a plant to meet any conditions.

When planning *your* plant, why not let Butler assist you? Our engineering service carries no obligation, and we will be glad to go into your requirements with you. Consult us today, and let us save you time and money with Butler time-tested equipment.

IN THE KENTUCKY STONE COMPANY PLANT . . . . . .

TELSMITH GYRASPHERE produces 120 tons per hour of minus 1½" stone!



●Wide experience . . . gained in operating ten quarries in Kentucky . . . has made the Kentucky Stone Company of Louisville very critical of quarry plant equipment.

For their Tyrone Plant* they selected this No. 48 Telsmith Gyrasphere because they wanted to get finer crushing, a wider range of sizes as well as greater tonnage. Are they getting it? *They are.*

120 tons an hour of 1½" and down!

And the Gyrasphere would do better still, if the primary breaker, and the two vertical skips that hoist the rock from where it is mined underground, could dish it up any faster. With its unregulated choke feed this Gyrasphere sure can take it—and handle it—with less trouble, less power and less up-keep.

And why not—it's a rugged, high-speed, super secondary crusher—with every modern feature of design. Spherical head! Double wedge crushing action! Roller thrust bearings! Spring relief! Effective sealing and lubrication! Furnished with interchangeable coarse or fine crushing concaves, you can get the sizes you want—1½" to ⅜", or ⅜" to ⅛". And you'll get better, more cubical aggregate, too. *Bulletin Y-11* tells you why and how. *Get one.*

** Plants at Irvington and at Russellville have also been modernized with Telsmith crushing and screening equipment.*

Y-2-40

TELSMITH

SMITH ENGINEERING WORKS

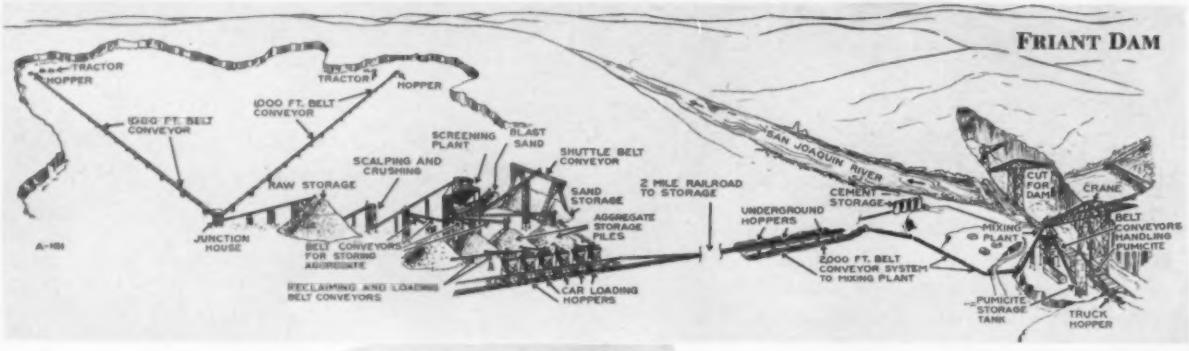
508 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

50 Church St. New York City — 211 W. Wacker Drive Chicago, Ill. — 713 Commercial Trust Bldg. Philadelphia, Pa. — 61 Binney St. Cambridge, Mass.

Brandeis M. & S. Co. Louisville, Ky. — Wilson-Weesner-Wilkinson Co. Knoxville and Nashville, Tenn. — Choctaw C. & M. Co. Memphis, Tenn.

Charleston Trac. & Equip. Corp. Charleston, W. Va. — Roanoke Trac. & Equip. Co. Roanoke, Va. — United Steel Sales Toronto, Ont.

3 miles of S-A belt conveyor-



Friant Dam Aggregates Handled At 650 T.P.H. by S-A Conveyors, Screening and Crushing Plants

Three miles of Stephens-Adamson Conveyors, Vibrator Screens, Feeders and auxiliary equipment were selected by the two concerns holding the joint contract for Friant Dam, part of the Central Valley Project of the Bureau of Reclamation, which will provide 520,000 acre feet of water storage.

Outstanding Material Handling jobs the world over bear the S-A name. Whether your requirement be large or small, we would like to submit our recommendation for handling *your* material *at the lowest possible cost per ton over the life of the equipment.* Write us!

Our First Customer!

Since this issue of ROCK PRODUCTS honors Frank Renwick of the Chicago Gravel Company, we too wish to add our congratulations to Frank... *our first customer*... and still a valued customer... *and friend.*

STEPHENS-ADAMSON
MANUFACTURING COMPANY
7 Ridgeway Ave.
Los Angeles, Cal. AURORA, ILL. Belleville, Ont.

SA ENGINEERS MANUFACTURERS

"IT COSTS LESS PER TON THE S-A WAY!"

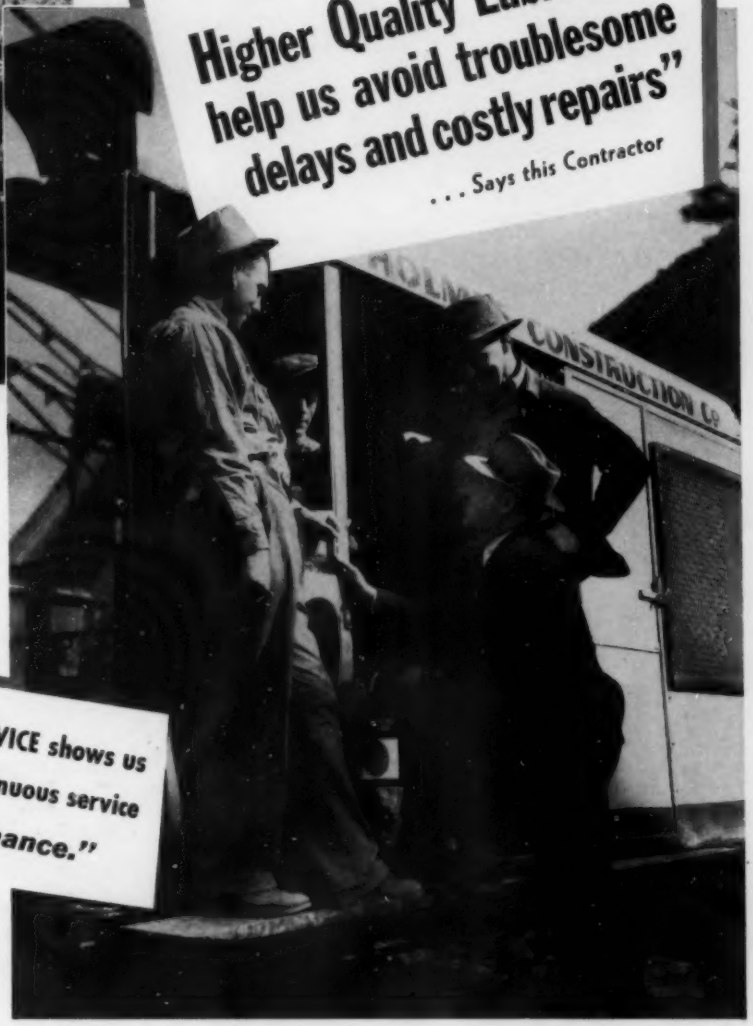
Conveying • Elevating • Screening • Transmission Equipment

"Our Diesels have gone well over 4,000 hours without replacements since we standardized on Gulf's higher quality lubricants," *says Contractor.*

(At right) Discussing a lubrication problem with men on the job, is one of the beneficial services rendered by the Gulf Engineer.

"Gulf Higher Quality Lubricants help us avoid troublesome delays and costly repairs"

. . . Says this Contractor



"GULF PERIODIC CONSULTATION SERVICE shows us how to keep our equipment in continuous service with less cost for maintenance."

"THE profit on any contracting job depends on the speed and efficiency of the equipment that does the work," says this Contractor. "That's why we use Gulf higher quality lubricants—we can always depend on the extra margin of safety we get when we have these fine lubricants in service."

Contractors all over the country rely on the extra stability of Gulf's higher quality lubricants. They do the kind of lubricating job that means less cost for maintenance and repairs — and long life for expensive machinery and equipment.

Call in a Gulf Engineer when you start your next job. Find out how GULF PERIODIC CONSULTATION SERVICE can help you cut costs. Write or phone your nearest Gulf office—there's no obligation.

Gulf's higher quality oils and greases are quickly available through more than 1100 warehouses in 30 states from Maine to New Mexico.

This booklet will suggest to you a practical method by which you can reduce operating and maintenance costs for your equipment. Write for your free copy.

Holmes Construction Company, Wooster, Ohio depend upon Gulf's higher quality lubricants for all their equipment on this road construction job in Venango County, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company
3800 Gulf Building, Pittsburgh, Pa. R.P.
Please send me my copy — no charge — of the booklet "GULF PERIODIC CONSULTATION SERVICE."

Name .....

Company .....

Address .....

A Pioneer User of SYMONS CONES

For fourteen years, this four foot Symons Cone has done the fine reduction crushing at the Rockdale Plant.

Among the first Symons Cone Crushers sold was a four foot size for the Rockdale Plant of the Chicago Gravel Company. That was in 1926. In the following year and also in 1928, this same company again installed two more Symons Cones in its other plants, all three of these crushers being still in service. The Cone Crusher was then a new and revolutionary development but this progressive gravel producer had faith in this new process of crushing and saw in it the solution for the then existing problem of producing the finer sizes. The cooperation given by this and other early producers of fine crushed materials did much in promoting the rapid and universal recognition of the Symons Cone as the most outstanding crusher ever developed for the reduction crushing field.

When faced with the problem of finer crushing, profit by the experience of the leading producers of crushed gravel, stone and other aggregates who make such materials with Symons Cones. There is a size and type for plants both large and small.

NORDBERG MFG. CO.

MILWAUKEE
WISCONSIN

New York City
60 E. 42nd Street

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Bush House

Toronto
Concourse Bldg.

SYMONS CONE CRUSHERS

This Shovel Won't "Renig" ON ANY KIND OF ROCK

LORAIN 87 SHOVEL
BOOM FEATURES

1. All-welded construction.
2. Side members designed to combine the strength of a plate girder with the torsional resistance of a tube.
3. Shipper shaft casting plus series of X-bracings of H-beam sections are welded to side members and to each other to produce a strong, unified all-steel structure having maximum resistance to side deflections and torsion.

• You can trot out your toughest digging for the 2-yd. Lorain-87, for here's a shovel that really revels in rock. Its all-welded 26-ft. shovel boom is a tower of strength. Center Drive design of turntable produces a simplified, compact assembly having fewer and stronger parts; mobilizes engine power for quick, direct-to-the-point transmission; and puts every pound of weight to work to produce maximum capacities. Rounding out the "87's" rugged construction is a big, burly, 2-speed Center "Chain" Drive crawler that's built for bruising service, yet capable of maneuvering this heavy-duty shovel in and out of tight spots with the speed and finesse of a feather weight.

If you want a shovel that's ready to move rock in a big way, all day, every day—write for catalog describing the Lorain-87.

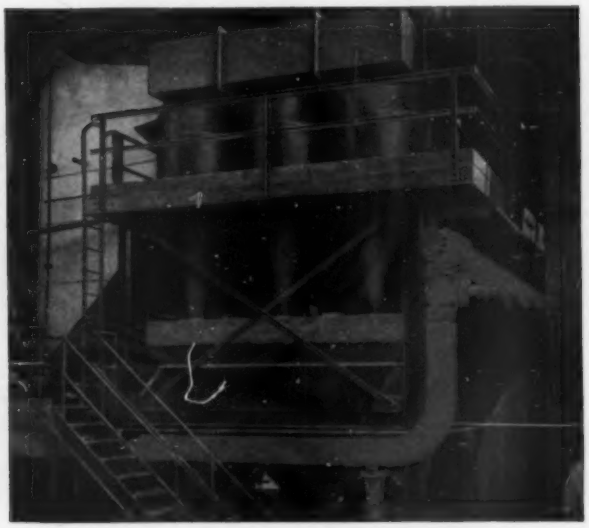
THE THEW SHOVEL COMPANY
LORAIN, OHIO

THEW CENTER DRIVE

2 YD. LORAIN-87

The A B C *of why*

so many cement plants rely on buell DUST COLLECTORS



A *Low initial cost*

B *High efficiency*

C *Low operating cost*

Have you read Buell's new 24-page book "DUST IN INDUSTRY"? A copy will be sent upon request.

BUELL ENGINEERING COMPANY, Inc.
Suite 5000, 2 Cedar Street, New York

Offices of Buell Engineering Co. or B. F. Sturtevant Co. in principal cities are ready to serve you, wherever located.

You Can't Drive a Spike

...with a Tack Hammer!

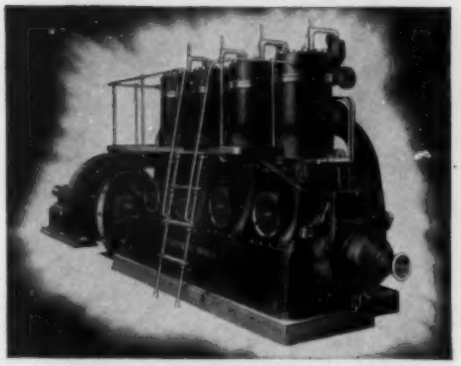
TACK HAMMERS are useful tools—but not for driving heavy spikes. That takes a *heavy-duty* hammer.

For heavy-duty power jobs, Fairbanks-Morse recommends the slow-speed, two-cycle, *heavy-duty* Diesel . . . for identically the same reason that you can't drive a spike with a tack hammer.

Slow speed reduces wear on moving parts. That is *important* where an engine must operate months on end without servicing. Maintenance cost records show just *how* important!

The simpler, two-cycle principle reduces moving parts to a minimum. Service is easier and costs much less. *Operating cost records prove* THAT, *too!*

Yes, where there's a hard job of work to be done—take a tip from the broadest Diesel experience in the world and *put a work Diesel on the job*—a Fairbanks-Morse Diesel of the s-l-o-w-speed, two-cycle type. For detailed information, write Fairbanks, Morse & Co., Dept. 136, 600 S. Michigan Ave., Chicago, Ill. Branches and service stations throughout the U. S. and Canada.



Model 32 Fairbanks-Morse Diesel; this is a slow-speed, 2-cycle engine built for heavy-duty service in mine, mill, factory—or wherever *long, continuous, heavy-duty, low-cost power* is a *must.*

7832-OA40.172

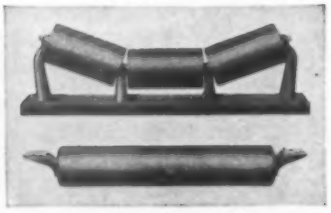
FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
FAIRBANKS SCALES
RAILROAD EQUIPMENT
WATER SYSTEMS
WASHERS-IRONERS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS

F-M

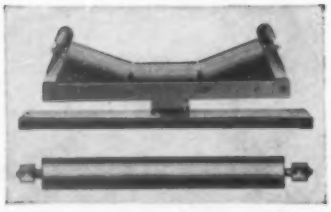
Diesels

NOW IS THE TIME TO . . .



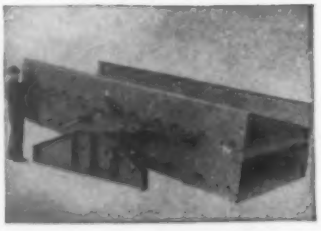
REPLACE WORN OUT CONVEYOR IDLERS

Robins Improved Roller Bearing Troughing and Return Idlers pay for themselves in savings from lower power consumption, less maintenance and uninterrupted operation. Interchangeable with "Robins" and all other idlers.



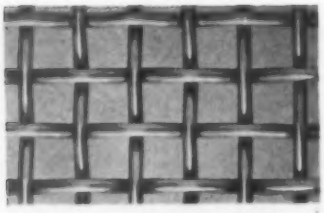
STOP THE CHAFING OF BELT EDGES

Robins Belt Training Idlers in place of a few of your standard troughing and return idlers, stop crooked running of belts and prevent expensive chafing of belt edges on structures.



GET FULL PROFIT from ACCURATE SIZING

Robins Gyrex, Vibrex and Eliptex Screens not only handle great tonnages with little power but have established a high standard of accuracy. Hundreds of size and style combinations from which to select.



REDUCE THE COST OF SCREEN CLOTH

The long life due to the inherent resistance to abrasion of Improved Super-Gyraloy screen cloth makes replacements infrequent. Available in all standard weaves and sizes.

ASSURE DEPENDABLE GATE OPERATION

Robins Bin-Gates never jam. Both single and double Standard Cut-off Gates are exceptionally rugged and at the same time inexpensive.

MATERIAL HANDLING
ROBINS
EQUIPMENT

ROBINS CONVEYING BELT COMPANY

Sales offices in principal cities

PASSAIC, NEW JERSEY

SEND FOR DESCRIPTIVE BULLETINS OF PRODUCTS OF INTEREST TO YOU

WHY VOLUNTARY ASSOCIATIONS?

How often have you thought, or maybe said, and you surely have often heard it expressed: "Why should I pay my good money to maintain something that will help a lot of other guys who won't pay the freight?" That's a logical question, why should you? Maybe the only answer that will satisfy a hard-boiled board of directors is that you get special service of some kind or other which those who don't belong don't get.

That answer is all right so far as it goes; but if you are really sold on associations there is a deeper and more significant reason for supporting them. It is because you know instinctively that *if* you or your company is going to progress very far you have got to take the whole group in that industry along with you, even though it holds back; for if it doesn't come with you, sooner or later it will pull you back. Thus you know and practice the most fundamental tenet of the American way of life.

The establishment of the United States as a nation was under conditions and circumstances that favored intense individualism—personal freedom of thought and action. And, for all but the black slaves, there was true equality of opportunity for everyone. The country was of vast extent and thinly populated. Such conditions favored rapid disintegration of society except for one outstanding deterrent. That was the home-made, home-grown political philosophy of the original citizens of the United States.

In America there were no great landlords and noblemen, who elsewhere in the world were the accepted leaders or patrons of art, literature and science. Americans prided themselves on their freedom from such overlordship and patronage, and on their ability to do without them; on their ability for *every* man to take care of himself and his family. But Americans learned early that where every man is free and equal, every man, as an individual, is powerless in face of some of society's pressing problems.

So when they wanted to accomplish something beyond their capacity as individualists, what did they do? They formed a *voluntary* association with self-chosen leaders. Maybe the objective was the establishment of a church, hospital or college; maybe it was to promote a new road or canal. Their experience in political organizations led naturally to economic organizations.

We can learn more from the early practice of the American way of life, than we can from current statements of political theory, or even from those fundamental theories expressed in the Declaration of Independence and the Constitution of the United States. This practice was bred into the bones of those of us whose ancestry in America is a century or more old; and these concepts and their practice are what we are trying to recapture, if America is to remain America.

The national trade or industrial association is one survival of that primitive Americanism. It is instinctive recognition of the truth that promotion of the common good is our business, and everyone's business, although we are too practical and too experienced to believe that everyone, or even a majority, will take an active part in the promotion. Nor have Americans ever kidded themselves that this policy was being pursued by them because it was noble or magnanimous. They knew it was pursued because as individualists their fate and fortune depended on the fate and fortune of their fellow citizens.

Why not then compel the slackers, the chislers as you may call them, to kick in with their contributions? Remember, we tried that in 1934 under N.R.A. Fortunately, we found out that as soon as these organizations ceased to be *voluntary* organizations, they ceased to be American; and attempt to make them otherwise would have been killed by public opinion, had not the U. S. Supreme Court decided the issue. What employer associations found out by experience in 1934 and 1935, labor unions are finding out by experience today. The government has given them the right to coerce free Americans into membership. Thank God, there is enough of old Americanism left to cause resentment. A recent Gallup poll shows public *good* opinion is rapidly being lost by union labor.

What associated effort does, if it is successful, is organize favorable public opinion. Some issues—many of those affecting single industries, or groups of industdustries—require to achieve only favorable public opinion in a limited sense. It is the chief function of industrial associations to organize their share of such public opinion.

With the association convention season near at hand, with national defense and patriotic fervor on the rise, it is a good time to remember *why* American associations are *voluntary*. If they were otherwise we would have lost our heritage, and the things that we are now ready to fight for. But these things need defense from within fully as much as from without; and association members are the home guard.

Nathan C. Rockwood

NEWS AND COMMENT

Surely Coming!

THE DEFENSE PROGRAM of the United States will dominate the construction field in 1941, the Dodge Statistical Research Service said on November 21, predicting that next year's total building volume would top all records since 1930 and that public construction would reach a new all-time peak. The authority forecast combined private and public building and engineering awards in the 37 eastern states for 1941 at $4,400,000,000, an increase of 14 percent over this year's estimated volume of $3,850,000,000. Public awards for next year, expected to consist principally of Army, Navy, Air Corps, defense industry and defense housing work, were forecast at $2,200,000,000, up 31 percent from the 1940 level, while private awards were estimated at the same amount, which would represent a gain of only 1 percent.

Using a Waste Product

QUARRIES and gravel pits are stripped of top soil, often several feet deep. That top soil required many thousands of years' work on the part of nature, and is therefore an irreplaceable asset. It supplies the means of feeding men and animals. It is usually dumped in heaps in the worked-out part of the pit. In any one operation it doesn't amount to much but in the aggregate we suppose producers are destroying several thousand acres of crop land every year.

We do know of some sand and gravel and crushed stone producers near cities who have sold stripping for lawn dressing, but now comes a producer out in the country in Illinois (near Sterling) who is frugal enough, or conservation-minded enough, to put his stripping in a limestone spreader and spread on land that he uses for growing crops. He is Vernon Schrader, a sand and gravel producer.

Who Pays Taxes?

MATTHEW WOLL, vice-president of the American Federation of Labor, has an article in the November 15 issue of *Printers' Ink* entitled: "Incentive Taxation, Rather than Punitive, Is Demand of Labor." The editor describes it as "a stirring plea for free enterprise." Maybe it is, but Mr. Woll and the editor seem to have overlooked some glaring discrepancies.

Mr. Woll says: "In general, Labor favors direct taxes, such as land, property, income and inheritance taxes, rather than indirect and 'hidden' taxes. It favors progressively higher rates of taxation on larger incomes, not with any thought that Utopia may be won by the taxation route, but because those of means are better able to pay."

Who pays "the direct tax on land and property?" Any reflection at all ought to convince Mr. Woll that Labor pays it. Labor pays it in higher rents, higher food costs, higher clothing costs, higher costs of everything that Labor buys. It is the most obvious of indirect taxes on Labor. Income taxes on higher salaries come out of the things that Labor buys, because higher salaries are necessary in order to give talented men who manage business enough net income after taxes to attract them to use their talents. It would be much beter for Labor and for all of us if the Government did raise its funds by *direct taxes*—sales taxes for example.

His Majesty's Loyal Opposition?

WE HAD A HUNCH that the national election might go as it did! And then, being optimistic, we couldn't help thinking that if only the people would elect congressmen "with guts," the administration might turn out fairly satisfactory to industry after all. We have never blamed the President for many of the things he is condemned for, more than we blamed the "rubber-stamp" Congresses. He has done nothing to lead us toward alleged dictatorship that the Congress could not readily have prevented, merely by not acquiescing.

The complexion of the new Congress is not known very well at this writing, but it is said to be about the same as the present one; and the present one has shown enough courage to stay in session, presumably to keep the President from "pulling any fast ones." We don't know that he wants to; but we do agree with business men generally that one of his chief failings is lack of stability of conviction—if we make our meaning clear.

The President's reaction to the vote in the House of Representatives on November 19, to stay in session, is really quite illuminating. If the *Chicago Tribune* is to be believed (and it can't be, sometimes): "Mr. Roosevelt said at his press conference he had no official comment to make on the House's action, asserting it made no difference to him whether Congress remained in session. The President said he did not know what Congress proposed to do with its time since he had no important business for it before the next session. He previously had said he had no further legislation to submit this year and was not interested in pending legislation."

Business men may recall that the Congress has before it some very important proposed legislation which the President *did not* submit; for example the Walter-Logan bill which would restore a little justice to industry in the high-handed methods of running Government bureaus and commissions. There are also proposed changes in the National Labor Relations Act, to remove some injustices to employers. If we remember our American history and political science correctly, it is the Congress that is supposed to initiate legislation, not the executive.

Vicious Coercion

LIKE MOST modern employers we have no objection to labor unions; in fact we think they have rightfully become an essential factor in our national political economy. But we do think, if this is to remain a free country with any degree of personal liberty, labor unions should justify their existence by services rendered their members and sell membership on that basis, the same as any other service is sold.

The *Zanesville* (Ohio) *Tribune* carries a regular column entitled "Cement Plant News." It is anonymous, but is really cement plant workers' union news, which is justifiable, even if not accurately captioned. The October 11 issue, however, contains one item which is a disgrace to any newspaper, however picayune, which would publish it. The item reads:

> In case there are any who do not belong after this week, they will know from personal experience just what is meant by the "Curtain Will Fall."

Only fools and bullies make threats.

In a Lighter Vein!

A FRIEND picked the following item from the *Helena* (Mont.) *Record-Herald* last summer. We got a laugh out of it; and put it aside. It has occurred to us; you might laugh, too.

There's more monkey business at the display room in the Placer hotel. A new company, the U. S. Gyp'um corporation, came out of nowhere with a display that's making people wonder.

The U. S. Gyp'um company's exhibit is floating about in a pan of water. I. M. Sunk is the com..pany manager—Buoyant C. Flotsam is the president.

The've put a new ore on the market, according to the placard above the exhibit. They've named it "termite" because of its worm-eaten appearance, although several men who know say its a common, ordinary rock known as float rock.

The placard goes on to say that termite is mined by a new process. The shaft is filled with explosive gas, a match is dropped down the hole, and the termite is mined. All they do then is flood the shaft and out floats the termite. It's even floated to market.

At the bottom of the sign is written, "the first termite operation in Montana has no connection with the third-termite operators in Washington."

Gypsum for Defense

ROCK PRODUCTS manufacturers haven't begun to realize the importance of their commodities to national defense, judging by reports reaching the editor from many representative producers and manufacturers. Our contemporary *Building Supply News* for November quotes M. H. Baker, president of the National Gypsum Co., on just one item—gypsum wall board—as follows:

"A hurried survey by certain members of the defense commission indicated there might be a need in 1941 for three billion feet of gypsum board. This is about one billion feet in excess of industry capacity.

"I am not too disturbed about this because there is every indication that the defense commission is over-optimistic about completing that much of its program next year. I would make a guess that during 1941 the requirements will not exceed two billion feet. I would also make another guess that about two billion feet will be required annually for each of the next three years. The thing that bothers me most in this connection is the industry housing. Why, right here in Buffalo we have one plant going up that will employ 15,000 people. This plant will be twelve miles out, and in studying the community I am convinced they will certainly need 5,000 new housing units just for that one plant. Multiply this, if you will, for hundreds of similar situations that may develop during the next two years.

"If this immediate government business for cantonments can be scheduled so that it doesn't all come in at one time, I hope we will be able to take care of our dealer trade, but the danger is having too many of these cantonments requiring wallboard at the same time. And if we reach that kind of a situation we must then decide the advisability of refusing government orders to take care of our trade and thereby take the risk of our plants being commandeered as provided for under the conscription act.

"As plant activities increase, labor is going to become more and more scarce and that will result in higher labor cost, not only for our own product but on those things which we must buy. And in surveying that it looks to me very much as if we would be faced with a higher cost sometime between now and spring, and at that time we will have to consider seriously the advisability of advancing prices sufficiently to cover our usual profit margins."

For Speech Makers

WE HAVE accomplished orators in the rock products industry. For those who may be discussing peace and war, the third term, or even such prosaic subjects as concrete and aggregates, the following statistics should make a dent. They are from the Missouri A.G.C.'s *Construction Advisor*:

"The Maginot Line, that lengthy underground fortress which was to have kept the Nazis out of France, gave work to some 15,000 men. The Pennsylvania Turnpike, one of the world's most modern and most marvelous stretches of highway, employed the same number.

"The Maginot Line involved 20,000,000 cu. yd. of excavation; the Turnpike, 26,000,000.

"The Line called for 50,000 tons of steel; the Turnpike for 46,500 tons.

"Into the Line went 2,500,000 cu. yd. of concrete (now declared by the Germans to have been of very inferior quality; into the Pennsylvania Turnpike went 1,650,000 cu. yd., known to be of the best.

"Frenchmen worked on the Maginot Line for 10 years. American industry built the Turnpike in 20 months.

"The Maginot Line is already a war relic, partly destroyed, valueless to its builders. It failed to serve its purpose. The millions it cost were wasted.

"The Turnpike is at the very beginning of a long life of service. It is already doing what it was built to do."

Strategic Military Roads

A MAP of strategic military highway routes in the United States, published in *The United States News* is very similar to the one familiar to industry in that it includes most of the important trunk routes, east and west, north and south, connecting all the principal cities and industrial centers, with particular emphasis on routes paralleling the coast lines.

Larger Markets for Cement

THOSE OF US who remember the plight of the portland cement industry during the 1917-18 world war must be struck by progress made in developing uses and markets for cement in the last 20-odd years. Then the portland cement industry was declared a non-essential industry and was generally deprived of fuel and power and cars. That led to one of the greatest feats in all the history of product promotion. Ships were urgently needed, and it was demonstrated that ships could be built of concrete!

Today we have quite a different picture, for cement is now essential to the defense program in many ways—for example, mixed with soil it provides stabilized bases for airplane runways, as well as paving for permanent type runways; for heavy duty military highways; for construction of naval drydocks, etc.

Equally important is the fact that cement is now so well established in the dwelling construction field that large quantities are being used even in "temporary" barracks and dwelling houses. For example we quote from "Asbestos," for November: "Volume asbestos-cement products is running well ahead of last year in every one of the several asbestos-cement products, due to the important part that these products are playing in national defense construction work. Thousands of squares of asbestos-cement siding are being used at the various defense bases, as well as hundreds of thousands of square feet of corrugated and flat sheets, wallboards and tile. While this business has already increased the volume of shipments substantially over last year it has also created a substantial backlog of orders for delivery during the next few months as some of the larger government projects reach the stage of construction where they are ready for exterior covering. Thus the prospects are that the asbestos-cement industry will enjoy an unusually large volume even during the winter months, and manufacturers and trade are finding it necessary to plan well ahead."

From which we believe that many portland cement manufacturers are furnishing much more cement "for national defense" than they realize. In Germany we are told the army is using cement for bombs, in order to conserve steel. And if the necessity arises in this country to construct bomb shelters, judging by English experience, our mills will not be able to fulfill the demand.

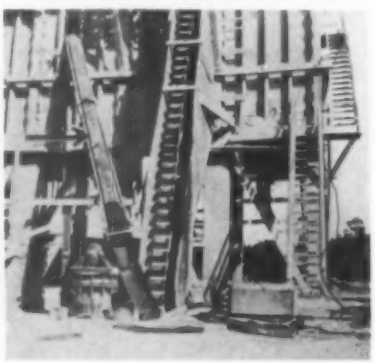
Hints and Helps

★ FOR SUPERINTENDENTS ★

Increasing the Life of Stone Chutes

By F. J. PEARSON
Supt., Winnipeg Supply & Fuel Co.,
Winnipeg, Canada

IN THE ILLUSTRATION is shown a helpful suggestion to those who are using open fixed chutes for stone or gravel. Make a trough with 2-in. lumber on the sides, the width of the lumber being not more than half the width of the trough. On the bottom, nail pieces of 1- x 4-in. lumber, just enough to make the sides fairly solid. Then procure a sheet iron pipe of a diameter that will fit easily into the trough. Place pieces of strap iron over the pipe, bolted or nailed to the 2-in. lumber on the sides. This is done to keep the chute from slipping.



Use heavy sheet iron pipe for a stone chute. Pipe held in wooden trough may be turned as it is worn

When the chute shows signs of wearing thin, loosen the bands and give the chute about one-fifth of a turn. Repeat as necessary until the chute is worn out. Even after it is discarded for the stone there are still uses for the pipe.

We use a chute like this when returning oversize to a crusher from a 2½-in. mesh screen. The chute, 30 ft. long, in two sections, is 13-in. diameter and is of 12-gage iron. The last one was installed in May, 1939, and the previous one in July, 1931.

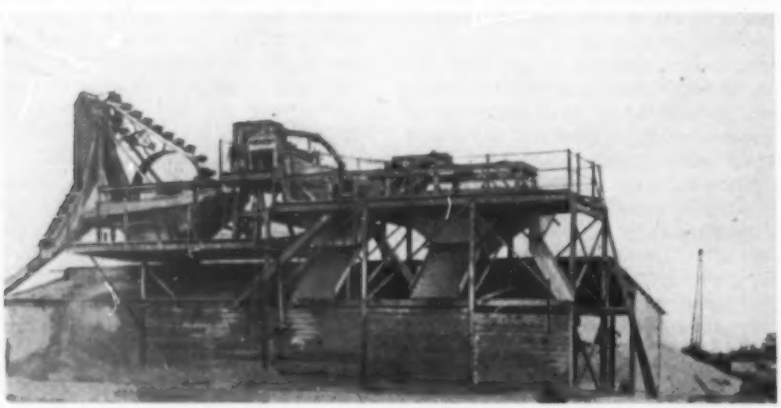
Remember that a round chute needs a larger diameter than one that is square due to the tendency of the stone to bind in the round bottom. The outside diameter of the chute must also be less by one inch than the inside diameter of the trough. If the chute is tight it will be hard to turn.

Large Wheel Recovers and Dewaters Sand

IN THE ACCOMPANYING ILLUSTRATION is shown an English sand and gravel plant having an unusually large sand classifying and dewatering wheel. The plant, which was recently described in *Cement, Lime & Gravel*, is operated by the Ham River Grit Co.

All material is pumped from a sump to the top of the plant and into a "boiling box" from which it flows to a scalping screen. This oscillating type screen removes the sand and water and the oversize goes to another screen of the twin-opposed oscillating type with a reject deck at the feed end to remove the plus ¾-in. and 1½-in., or either size of material. This goes to an impact crusher and then back to the main sump.

The sand and water is chuted to the retaining box of the large dewatering and sand classifying wheel which is capable of handling from 25 to 30 tons of sand per hour. Dewatered sand is dumped by the buckets into a chute which drops it to ground storage. It will be noticed that the dewatering wheel merely serves as a large pulley over which travels a belt with buckets attached at regularly spaced intervals.



Sand and gravel plant equipped with a dewatering wheel of unusual design

Removing Clay Balls From Crushed Stone

CLAY BALLS are sometimes removed from gravel or crushed stone by stocking these materials in the open for long periods of time. As contrasted to this practice of air slacking to break down the clay, which requires considerable stockpiling area if any appreciable tonnage of material is to undergo treatment, Virginian Limestone Corp., Ripplemead, Va., uses a soak bin of original design.

This concern operates a large crushed limestone plant of 300 tons hourly capacity, about 50 percent of production being sold as commercial stone and the remainder for railroad ballast. Clay in considerable quantity is intermixed with stone as it comes from the quarry in industrial cars.

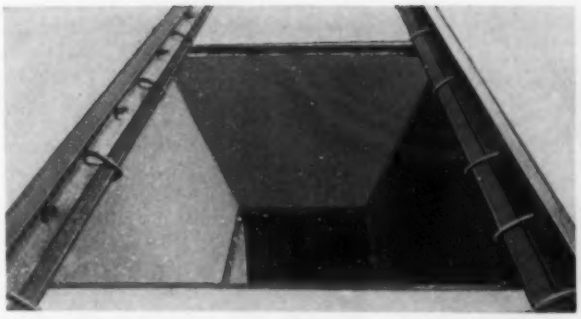
Soaking bin used to disintegrate clay balls in crushed stone

After passage through the primary crusher a separation is made over a grizzley with 4¼-in. sq. openings; the oversize, being free from clay and other contamination, is put through secondary crushers and the screening plant, which is entirely dry process.

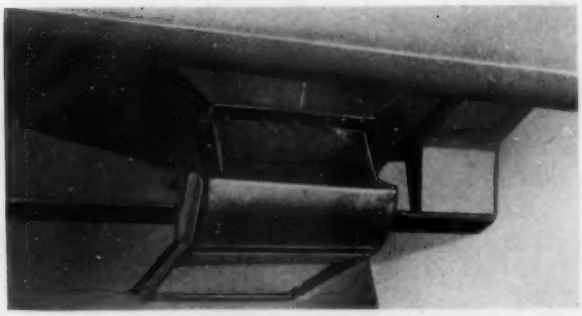
Water is added to the throughs which are washed into a flume, followed by dewatering and transportation by bucket elevator and belt conveyor to the washing plant. This material is all put over a 5- x 10-ft. double-deck Allis-Chalmers vibrating screen. A separation is made at 2½ in., all smaller material dropping into a soak bin and the overs dropping into a separate bin adjoining.

This soak bin has a capacity for 1000 cu. yd. of stone and stands 40 ft. high. Height is the important thing along with the application of water within the bin in breaking down clay balls so they can be washed out.

The soak bin is of timber frame construction with an outlet gate on



Steel hopper placed in concrete floor over elevated spur track with a truck unloading pit below. Heavy plank cover fits tightly into place when not in use



Below hopper is a hand-operated steel quadrant gate which permits unloading sand, gravel, crushed stone or coal to trucks driven into pit below

to a vibrating screen on one side near its bottom, leaving a live storage capacity of 850 tons. Similarly the adjoining bin for oversize stone has an outlet into a gyratory crusher. About 100 g.p.m. of water is constantly trickling down through the bin from the top, half of which comes through the previously mentioned scalping screen.

By constantly being soaked with water while under pressure from the material above the clay is softened, and is broken down when the withdrawal gate is opened. When drawn, material churns in a scouring manner at the bin gate, and the abrasive action is effective in pulverizing practically all the clay.

This is followed by washing over another 4- x 12-ft. Allis-Chalmers double-deck vibrating screen just under the draw-off gate where the load is split over screen decks with ¾- and ⅛-in. sq. openings for more thorough washing under pressure. This screen is also, in effect, a conveyor to an elevator which raises the stone to sizing screens from which loading is done directly into cars. Any dirty stone from the principal plant can also be put through this auxiliary.

Rent Plywood Forms To Sell More Ready Mix

KANSAS CITY QUARRIES CO., ready mixed concrete producer of Kansas City, Mo., is pioneering the use of foundation forms to permit servicing the job and guaranteeing it. About $2000 was invested in plywood forms which are made available to contractors. A standard charge is added to the concrete price, based on square footage of forms required, to pay for the use of the forms and the costs of oiling and placing tie-bolts. The company does business direct with contractors in the usual way but makes the forms available to get some of the jobs wavering between concrete and stone foundations. Thus far a number of jobs have been sold that are traceable to this service.

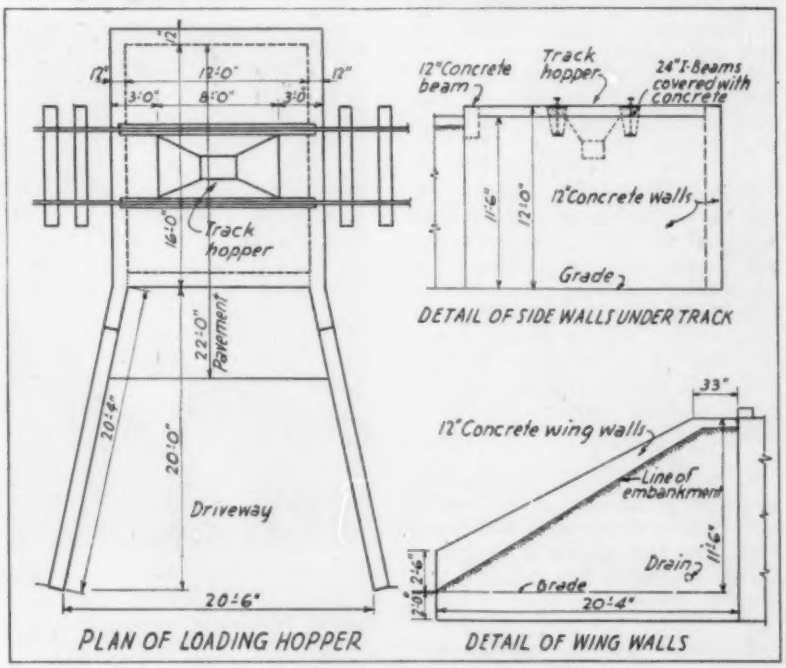
Pit Under Elevated Track Speeds Unloading

SMITH-NUPPNAU CO., Valparaiso, Ind., building material dealer, hit upon an unloading arrangement which may be useful to aggregate producers.

This unloading method, recently described in *Building Supply News*, consists of a pit constructed of concrete under an elevated spur track. Walls of the pit are 1-ft. thick, and the cover or ceiling is a slab 6-in. thick. Two 2-ft. steel I-beams support the ceiling slab, the steel hopper, and the railroad track. The floor is of concrete and extends 6 ft. in front of the pit. Concrete retaining wall wings are 1 ft. thick. The heavy steel hopper, fitting snugly between the rails, is 8 ft. long and 5 ft. wide at the top and tapers down to an opening at the bottom about 2 sq. ft. in area. It is equipped with a hand-operated quadrant type opening and closing gate for the free flow of materials.

As an illustration of its effectiveness, one 3-cu. yd. truck is reported to have hauled 210 tons of sand and gravel per day from unloading pit to a job requiring a two-mile haul.

In order to save ground space in stockpiling sand, gravel, and crushed stone, ramps were constructed on both sides of the pit on a level with the elevated tracks so that the trucks could dump their loads on the piles from this elevation. A road is conveniently located just to the left of the unloading pit which makes it possible for the trucks to drive up this incline or hill to the top of the spur track where the driver backs up his truck and dumps the aggregates on high piles on both sides of the pit. The unloading pit also is rented out by this company to industrial concerns and contractors.



Plan and elevations details of fast unloading pit

NEWS ABOUT PEOPLE

A. R. HALEY has been named sales manager of the Cement Division of the Pittsburgh Plate Glass Co., succeeding the late L. C. Letzkus. Formerly president of the J. P. Loomis Coal & Supply Co., Akron, he had been associated with this company for the past 20 years.

•

DR. EDWARD BARTOW has joined the research laboratories of Johns-Manville Corp. He has been granted a year's leave of absence as emeritus professor of chemistry and chemical engineering at the University of Iowa.

•

J. F. KAUFMAN has been appointed chief engineer of all the Ideal Cement Co.'s plants. He will make his headquarters at the general offices of the company in Denver. Paul Hensley, who has been assistant superintendent of the Ideal plant at Ada, Okla., succeeds Mr. Kaufman as superintendent of the company's plant at Okay, Ark.

•

J. G. WRIGHT, structural engineer, who served on the engineering staff of Permanente Corp. during the design and construction period of the plant, is now in the office of A. W. Earl, consulting engineer of San Francisco and is engaged on design work for the U. S. Navy.

•

HOWARD R. STARKE succeeds the late Earle MacDonald, vice-president in charge of operations of the Riverside Cement Co., Los Angeles, Calif. Mr. Starke will retain the title of superintendent. His appointment in April of this year as general superintendent of the Crestmore plant in charge of plant operations was reported in ROCK PRODUCTS, June, 1940, p. 48.

•

S. M. SHALLCROSS, vice-president and general manager of the American Lime & Stone Co., Bellefonte, Penn., has been elected to presidency of the Bellefonte Kiwanis Club for the year 1941.

•

BURTON F. MILLER has been appointed executive assistant to Charles M. Upham, engineer-director of the American Road Builders' Association. He will be in charge of the detailed operation of the Washington, D. C., offices in the absence of Mr. Upham.

•

CLIFF SPEARMAN has recently been promoted to the position of quarry superintendent with the U. S. Gypsum Co. and transferred from Port Clinton, Ohio, to Sweetwater, Texas.

•

FORD J. TWAITS has received jointly with Morrison-Knudsen Co., Inc., two contracts for temporary building construction totalling more than $6,000,000 at Camp Clayton, near Monterey, Calif. Mr. Twaits was formerly president of Consolidated Rock Products Co.; a director of the National Sand and Gravel Association, and also a member of the Mineral Aggregates Industries Committee under the N.R.A.

•

ROCK PRODUCTS announces the following changes in its own personnel: JOHN R. THOMPSON, who for 16 years has served our parent company, is now vice-president and general manager of the Tradepress Publishing Corp., publisher of ROCK PRODUCTS. Mr. Thompson is a native of Chicago, Ill., and has spent much of his business life here. RICHARD M. WARD, who has served ROCK PRODUCTS as manager of the Eastern office in New York City, and before that of the central territory with headquarters at Cleveland, Ohio, is now manager of the journal, with headquarters in the home office in Chicago. He is succeeded as Eastern advertising representative by Thomas E. McCann.

H. Hershey Miller, who recently was appointed resident engineer of the Pennsylvania Sand and Gravel Producers' Association. During construction of the Pennsylvania Turnpike he was testing engineer and assistant concrete engineer with the Commission

•

WALLACE L. CALDWELL, president of the Alabama Asphaltic Limestone Co., Birmingham, has been elected president of the Associated Industries of Alabama.

Obituaries

FRED HENRY HARDY, founder and owner of the Newala Lime Works, Newala, Ala., and a pioneer in the lime industry in Alabama, died recently at the age of 74.

•

ANDREW W. WEINMAN, general superintendent of operations of Thompson, Weinman & Co., Inc., Cartersville, Ga., and son of W. J. Weinman, president and general manager of the company, died October 2. He was 35 years of age.

•

WILLARD J. BELL, superintendent of the Newaygo, Mich., plant of Medusa Portland Cement Co. for several years when it was known as the Newaygo Portland Cement Co., died October 9 at the age of 72. He was president of the Newago Engineering Co.

•

STUART LAMAR RAWLINGS, executive vice-president of Calaveras Cement Co., San Francisco, Calif., died November 9. He graduated from the University of California in 1904, was manager of San Luis Mining Co. from 1905 to 1913 and general manager of the Cerro de Pasco Copper Corp. from 1917 until 1921. In addition to his executive duties with the Calaveras company he was a director of a number of other Pacific Coast corporations.

•

C. A. HORNSBY, a former foreman of the Canada Cement Co. warehouse at Halifax, recently lost his life while on duty in the Royal Canadian Navy. He was commander of the Royal Canadian Navy auxiliary mine sweeper "Bras d'Or," which was patrolling the Atlantic seaboard of the Canadian Coast. The ship was lost during a violent storm.

Fair Tolerances For Screening

ARTICLE TWENTY

On sizing, testing and specifying aggregates shows the difficulty of meeting impracticable specifications

By ELWOOD T. NETTLETON*

Vibrating screen with high pressure sprays gives maximum efficiency

MOST ENGINEERS feel that if stone is screened between two given screens with definite openings, the product will be entirely between those openings and in percentages uniformly graded from top to bottom. For example, if a product was screened commercially from 2½ in. to 1½ in., the expectant product under this assumption would be as follows:

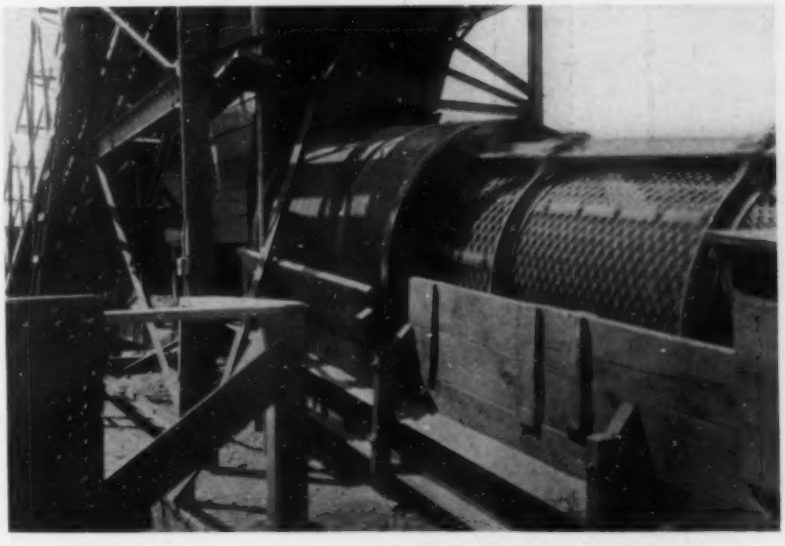
Size	Percent
Over 2½ in.	0
Between 2½ in. and 2¼ in.	25
Between 2¼ in. and 2 in.	25
Between 2 in. and 1¾ in.	25
Between 1¾ in. and 1½ in.	25
Under 1½ in.	0
	100

However, several hundred tests on the gradation of stone revealed that the actual results showed the commercial product given in the table below. Of course, there was variation within certain limits due to the numerous variables: type of screens, screen surfaces, load per effective screen surface and breakage.

Size	Percent
Over 2½ in.	1
Between 2½ in. and 2¼ in.	3
Between 2¼ in. and 2 in.	10
Between 2 in. and 1¾ in.	26
Between 1¾ in. and 1½ in.	35
Under 1½ in.	25
	100

In order to understand the reason for this, the theory or principles of screening might be briefly stated.

The fundamental principles or elements in screening are the passage of undersize particles through the screen apertures and the rejection of oversize particles.



Typical rotary scalping screen is still favored by many producers

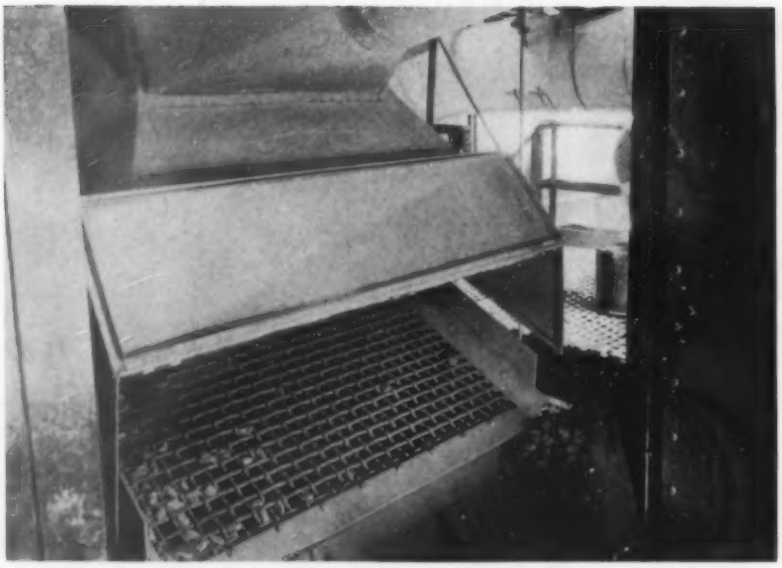
In order to effect this choice the particles must be brought to the openings and must be presented thereto at such a velocity and in such a direction that passage of the undersize will not be limited or prevented by rebound from the edges or walls of the opening. If every particle of undersize could be brought to an opening individually at substantially zero velocity in a direction perpendicular to the plane of the opening and with the center of its least projected cross-section in the line of the center of the aperture, and if the screening surface had zero thickness, there would be immediate passage of every such particle.

Practically, commercial operations are far from the above principles, as particles are crowded and continually interfering at the apertures, they are presented at considerably in excess of zero velocity in a direction nearly parallel to the plane of screen surface, with their maximum rather than their minimum projected surfaces parallel to the plane of the screen. As a result many undersize particles are prevented for a considerable time from access to an opening, others come to the opening from such a direction or with such orientation or at such velocity that they fail to enter, others entering are delayed in passage or stopped by friction against the walls of the opening.†

Consequently, to overcome the ac-

* General Superintendent, L. Suzio Construction Co., L. Suzio Trap Rock Co., The Suzio Trap Rock Co., and the York Hill Trap Rock Co., Meriden, Conn.

† Handbook of Ore Dressing—A. F. Taggart—pg. 498. Published by John Wiley & Sons, Inc., 1927.



Discharge end of vibrating screen, illustrating method of feeding

tual inefficiency of plant screens, as compared with testing screens, commercial quarries install screens of larger aperture than called for by specification. Therefore, actual plant screens might be 2¾ in. to 1⅝ in. with the resulting product as follows:

Size	Percent
Over 2½ in.	4
Between 2½ and 2¼ in.	10
Between 2¼ in. and 2 in.	19
Between 2 in. and 1¾ in.	24
Between 1¾ in. and 1½ in.	28
Under 1½ in.	15
	100

In many states specifications are so rigid that they allow only 5 percent and 10 percent undersize with an intermediate control factor based on theory. The specification is as follows:

Passing 2½ in. . . . . 95 to 100 percent
Passing 2 in. . . . . 40 to 60 percent
Passing 1½ in. . . . . 0 to 10 percent

In order to meet this specification and not to have over 10 percent pass the 1½ in., the producer would consider two things: First, raising the 2¾ in. to 2⅞ in. This would make the product fail because it would not meet the 95-100 percent passing the 2½ in. The next thing to consider would be changing the 1⅝ in. to 1¾ in. This would solve the problem for this particular size stone, but in so doing it would violate the next size having specifications as follows:

Passing 1½ in. . . . . 95 to 100 percent
Passing 1¼ in. . . . . 40 to 60 percent
Passing 1 in. . . . . 0 to 10 percent

What then is the solution? The solution is this—to write the specification tolerances of grading within the limits of present economically possible attainments in the best commercial practice. In this case the specifications should read as follows:

Passing 2½ in. . . . 95 to 100 percent
Passing 2 in. . . . . 60 to 90 percent*
Passing 1½ in. . . . 0 to 20 percent

and for the next size stone:

Passing 1½ in. . . . 95 to 100 percent
Passing 1¼ in. . . . 60 to 90 percent*
Passing 1 in. . . . . 0 to 20 percent

This is suggested as the result of hundreds of actual tests. Explained in simple terms, a 2¼-in. stone has a difficult time passing a 2½-in. opening, and if there are many of this size, a large percentage of them do not pass through the 2½-in. opening; whereas, almost all pieces of 1¾-in. would pass a 2½-in. opening with ease regardless of the number of pieces.

Simplified Practice Recommendation (R 163-26) was put through the routine procedure and adopted by the Division of Simplified Practice of the U. S. Department of Commerce in 1936, and with slight revision is supposed to be now in effect.

However, since then some of the difficulties of screening to the recommended sizes with the tolerances given have been called to the attention of producers, particularly by Irving Warner, vice-president, Warner Co., Philadelphia, in a paper read at the 1940 convention of the National Sand and Gravel Association. The present writer suggests a proposed grading specification as follows:

It is recommended:

First, that specifications be written clearly, fairly, and definitely.

Second, that national standardization of methods of routine testing be agreed upon and adopted.

Third, that regional standardization of definite limits for satisfactory test results be agreed upon and adopted.

Fourth, that regional standardization of definite sizes and tolerances in sizes be agreed upon and adopted.

(To be continued)

* Note change from 40-60 to 60-90.

PROPOSED GRADING SPECIFICATIONS AND USES

Testing Screen / Size Designation	Square 2½ in.	Square 2¼ in.	Square 1½ in.	Square 1 in.	Square ⅝ in.	Square ¼ in.	Square ⅛ in.
2¼ - 1½	100	95 - 100	0 - 20	0 - 5			
1½ - 1		100	95 - 100	0 - 20	0 - 5		
1 - ⅝			100	95 - 100	0 - 25	0 - 5	
⅝ - ¼				100	90 - 100	0 - 30	0 - 5
¼ - 0					100	90 - 100	
2¼ - 1**	100	95 - 100	45 - 85	0 - 15	0 - 5		

Approx. Production	Size	Use
33 percent	2¼ - 1½	Penetration Macadam (top)
22 percent	1½ - 1	Concrete Large Aggregate (Structures), Mixed-in-Place
17 percent	1 - ⅝	Conc. Small Aggregate, Penetration Macadam (Key)
16 percent	⅝ - ¼	Penetration Macadam (Chips)
12 percent	¼ - 0	Waterbound Macadam (Dust))
(55 percent)**	2¼ - 1	Concrete Large Aggregate, Waterbound Macadam, Macadam Bases, R.R. Ballast, Sewage Media
100 percent		

** Combination of sizes (2¼ - 1½) and (1½ - 1)

Approximate size of plant screens to meet the above specifications
2½ in. square, 1¾ in. square, 1½ in. square, ¾ in. square and ⅜ in. square

UNUSUAL FEATURES of Permanente

1 Limestone in San Jose, Calif., quarry needs no primary blasting.

2 Clay and limestone are ground separately and to only the requisite fineness—by stages in closed circuits.

3 All conveying except portland cement by belt conveyors.

4 Flotation of part of the limestone at the grinding stage where it is most easily separated from chert.

5 Very long, partly insulated kilns and near maximum heat economy.

6 Efficient dust recovery in all parts of the processing.

7 Stage grinding in closed circuits for clinker.

OTHER SPECIAL FEATURES

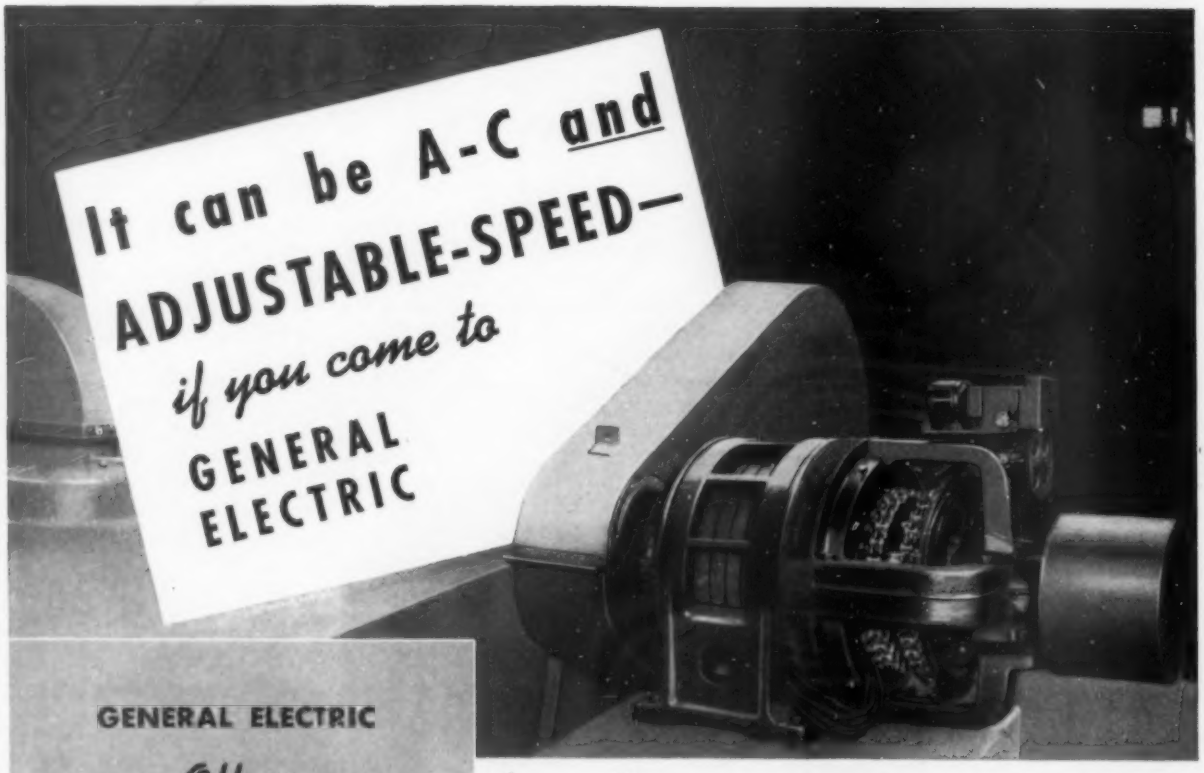
1 Screening clay slip through 60-mesh wire cloth in electrically vibrated screens.

2 Cleaning the hot air from clinker cooler by means of dust collectors. Both primary and secondary air for combustion is thus heated and cleaned.

3 Latest type a.-c. variable speed motor drive on one kiln.

4 Very complete instrumental control of burning operation.

Permanente



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Dependable Kiln Drives That Meet All Modernization Requirements

1. Direct-current with adjustable-voltage control
2. Direct-current with field control
3. Adjustable-speed, a-c (Type BTA)
4. Wound-rotor (slip-ring)
5. Squirrel-cage induction
6. Gear-motor (in certain sizes any type of motor can be used)

When you want an a-c kiln drive—with adjustable speed—remember that you can get it in our BTA motor, the only drive built for this service.

It has d-c shunt-motor characteristics. It has a range of dependable speed adjustment of three to one. Changes in kiln load will not cause it to speed up or slow down appreciably.

A recent installation in a large cement plant is demonstrating these advantages. It is also showing the adaptability of BTA drive to operation at any preset speed, obtained automatically merely by pushing the "Start" button.

With six different types of kiln drive available, General Electric is in a position to furnish a drive that will meet any set of operating requirements. Why not have our experienced application engineers go over your plans and make recommendations? Just get in touch with the G-E representative nearest you. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

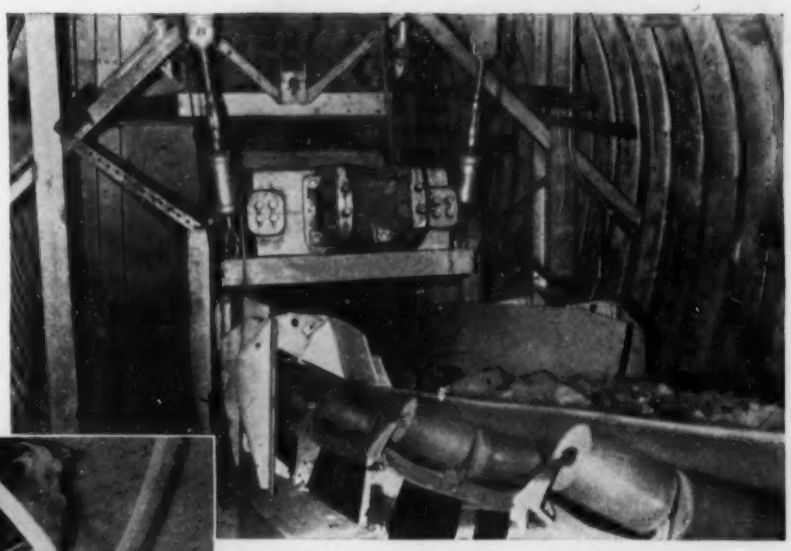
652-4

Permanente

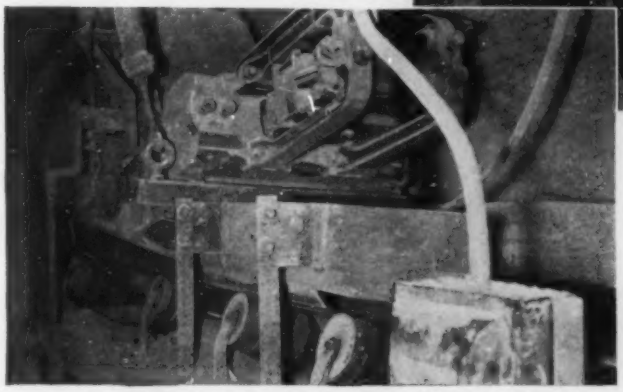
14 FEED-CONTROL UNITS AT PERMANENTE

From quarry to finished cement Jeffrey-Traylor vibrators control the flow of solids.

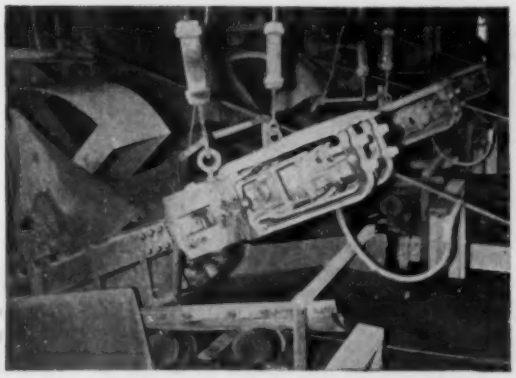
Jeffrey-Traylor electric vibrating feeders, screens, dryers, coolers and continuous weigh-feeding units . . . designed to deliver a uniform flow at controlled rate. Capacities vary with material and condition. Investigate.



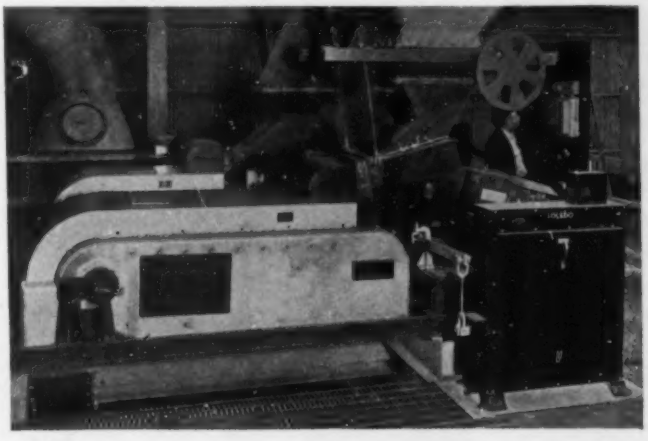
Heavy duty Jeffrey-Traylor feeder reclaiming cement rock. 500 T. P. H. from stock pile to conveyor.



Gypsum and clinker delivered to plant by Jeffrey-Traylor electric vibrating feeders. Feed rate by remote control.



Jeffrey-Traylor feeders (above) controlling feed rate for sugar rock picking tables, improving efficiency at picking belt.



Left—Jeffrey-Traylor Waytrols are used extensively throughout the cement industry for proportioning by weight. May be remote controlled or controlled by demand of grinding unit.

Catalog No. 650-N completely describes and pictures Jeffrey-Traylor electric vibrating units. *Send for your copy.*

The Jeffrey Manufacturing Company

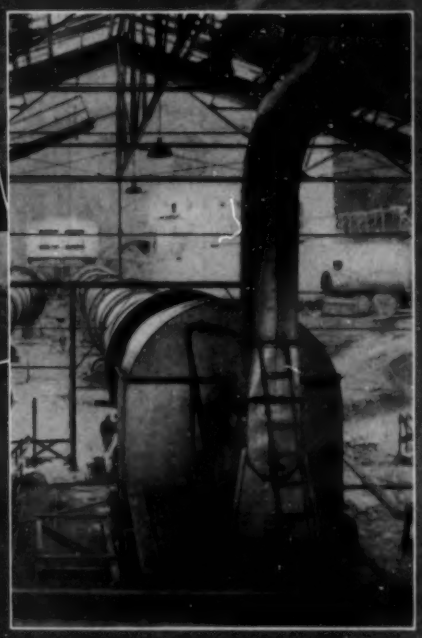
935-99 North Fourth Street, Columbus, Ohio

TRAYLOR

TRAYLOR EQUIPMENT at PERMANENTE

1 - 12'0" x 450'-0" ROTARY KILN
WITH
TRAYLOR-CHEESMAN BURNER SYSTEM
1 - 11'6" x 120'-0" ROTARY COOLER
1 - 8'0" x 40'-0" BALL MILL
1 - 7'0" x 26'-0" BALL MILL
3 - 9'6" x 10'-0" BALL MILLS
3 - 72" SLURRY FEEDERS
2 - 3'0" TY REDUCTION CRUSHERS
1 - #6 BH REDUCTION CRUSHER

at PERMANENTE

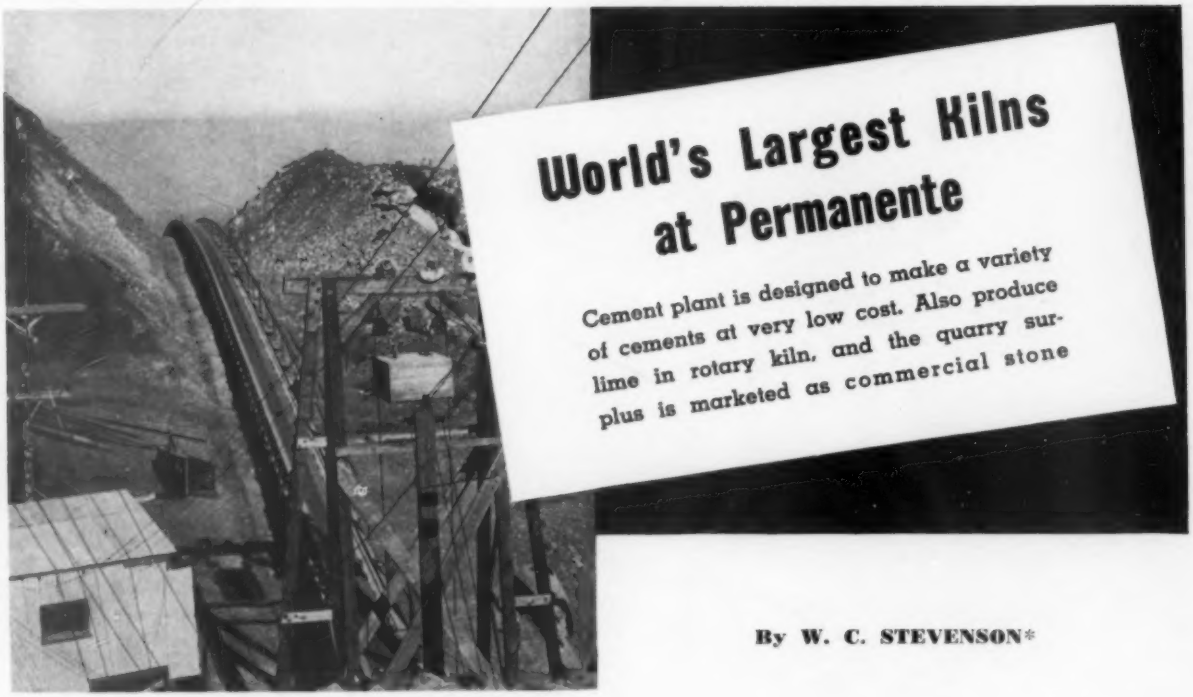


TRAYLOR

ENGINEERING & MANUFACTURING CO.

MAIN OFFICE AND WORKS — ALLENTOWN, PENNA., U.S.A.

Permanente



World's Largest Kilns at Permanente

Cement plant is designed to make a variety of cements at very low cost. Also produce lime in rotary kiln, and the quarry surplus is marketed as commercial stone

By W. C. STEVENSON*

Over a mile of belt conveyors transports stone from quarry to first point of screening

NESTLED IN THE HILLS, just above the wonderful fruit producing Santa Clara Valley, in Santa Clara County, about 45 miles from San Francisco and 12 miles due west from the City of San José, is a large limestone deposit. The Permanente Corporation has title to the property, comprising about 1300 acres, on which this deposit is located, and has built a cement manufacturing plant, a lime burning plant, a sizing and washing plant to produce clean and pure stone for the beet sugar industry and a commercial crushed stone plant.

The vision and resourcefulness of Henry J. Kaiser is responsible for the entire project; and his untiring efforts during all stages of development have succeeded in producing an industry which is modern in all respects and one in which, it is believed, cement can be produced at a cost lower than that of any other existing cement plant in the United States.

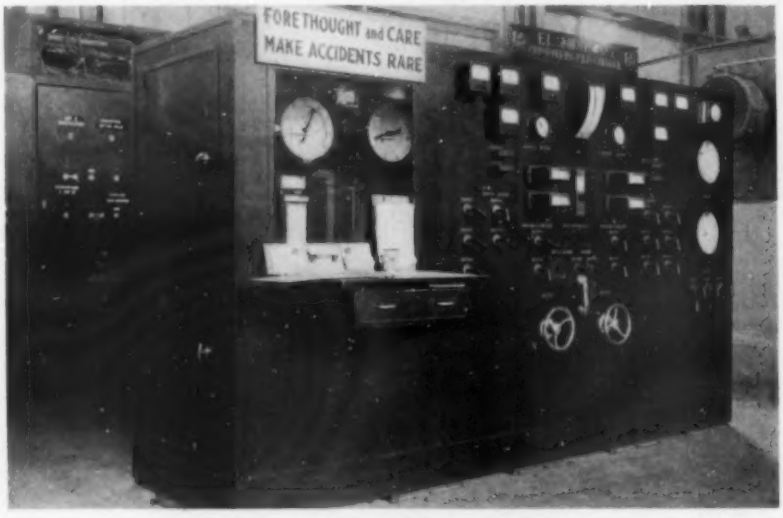
On June 12, 1939, the company made available the necessary funds for engineering and construction work and on Christmas day of the same year cement clinker was ground into portland cement. When the magnitude of the project is considered, the construction record may be found difficult of duplication.

The plant site selected in the hills was such as to give good foundations and to utilize gravity as much as possible to aid in the transport of material. The plant site was prepared by leveling and excavating, using power shovels, dozers and dump trucks.

The Southern Pacific railroad tracks, running from Palo Alto to Santa Cruz, pass within 2½ miles of the plant site. A connecting track was laid by the company from the plant to the main Southern Pacific tracks at Simla station. The construction of this line, including extensive yard tracks at Simla and at the plant, required 30 calendar days.

A county road passes through the property and connects with main highways leading to all parts of the state; thus, truck delivery of cement, lime, crushed rock or sugar rock can be made directly from the plant over county and state roads.

Permanente creek, from which the company takes its name, runs through the property. The company purchases water from a public service water corporation, and water is pumped from the valley below. A 500,000-gal. fresh water tank serves for the manufacturing make-up water, for domestic use and fire protection. Surplus water from the grinding and



Kiln room control panel for the two original kilns

* Consulting Engineer, San Francisco, Calif.

General view of cement plant showing mill building in center with hydro-separators and thickeners in the foreground, pack house to the right, and Cottrell dust collector building and stack to the left

treatment plant, as well as the return from water-cooled bearings and air compressors, is stored in a pond. Dirt from excavations was used to make a dam in a canyon near the plant, and the pond behind the dam gives storage for many thousand gallons of used water. Water from the pond is used entirely for manufacturing.

Limestone

The limestone deposit has its apex on top of Black Mountain, is quite extensive in area, and many hundred feet in depth. The formation is laminar, the layers being in various thicknesses up to a maximum of about 20 in., with only an occasional boulder. Between these laminae was deposited chert, or silica. The chert seams, generally, are of minor importance.

In quarrying it is necessary to take both limestone and chert together and at times it is found that the percentage of chert to limestone is above that allowable for a cement mix. In order to overcome this, the beneficiation process, by flotation, was adopted. In the flotation plant, the excess chert, in any desired amount, may be separated and wasted. It has been found in operation that a very small part of the rock needs beneficiation.

The limestone layers are generally horizontal but due to disturbances and upheavals, at times they are vertical. The upheavals have broken the layers into slabs of various sizes, usually not over 2 ft. in any dimension, which makes it possible to quarry the rock with no primary drilling and shooting.

The overburden covering the stone will average not more than 4 ft. in thickness. Brush growing in the overburden must be removed, but the overburden itself is such that clean stripping is not necessary.

Clay

The hills on which the plant is located are of a hard shaley clay, rather light in color and not washable. There are two distinct clays on the property; one containing a higher percentage of iron than the other. The chemistry of these clays is such that when mixed with the limestone, beneficiated if necessary, any kind of portland cement can be made. When making "low-heat" cement, it is necessary to add iron oxide. Aside from iron oxide and gypsum, no additive is required other than material found on the property.

The clay used in the process is excavated within 100 ft. of the mill building by a power shovel and is trucked a short distance to a clay storage bin. Under the bin a pan feeder delivers a regulated feed to a belt conveyor which transports the clay to a vibrating screen. The screen is equipped with ¾-in. openings, and the oversize goes to an Allis-Chalmers hammer mill. The throughs from the screen and the discharge from the hammer mill are conveyed by belt conveyor directly to a 7-ft. x 26-ft. two-compartment tube mill, for grinding.

The clay slip or slurry discharged from this tube mill is pumped to three 4-ft. x 5-ft. Hummer electrically vibrated screens, equipped with 60-mesh wire cloth. The screen rejects are returned to the mill for further grinding and the throughs are fed into a second 7-ft. x 26-ft. tube mill which has but one compartment. Screening the clay slurry through 60-mesh is a difficult operation — an unusual one — but the screens perform satisfactorily as long as the water content is maintained above a certain minimum and the screens are not overloaded.

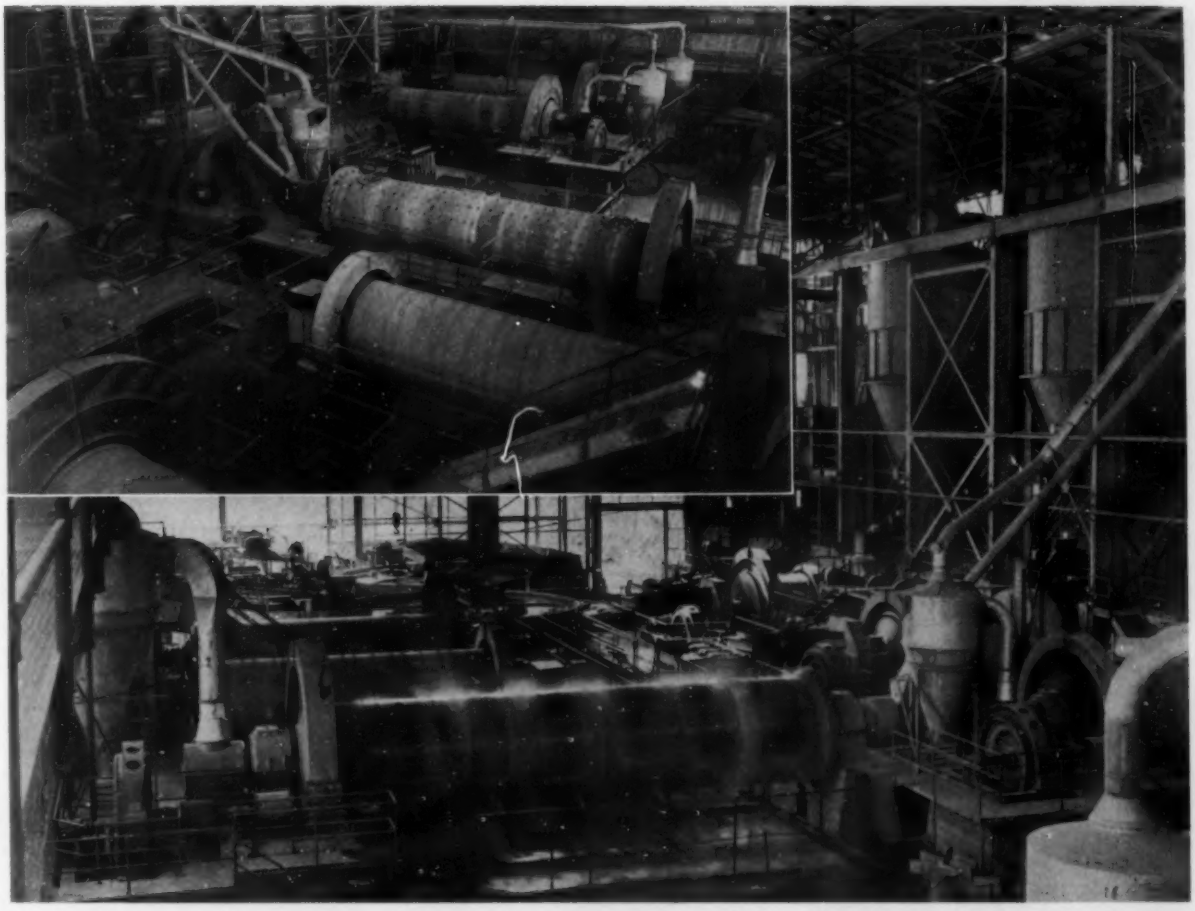
The finish fineness of the clay is such that 90 percent will pass a 200-mesh sieve. Owing to variable grindability, it is necessary at times to regrind the clay slurry in order to obtain the required fineness. (The above two-compartment tube mill was supplied by the Traylor Engineering and Manufacturing Co.; the secondary mill by F. L. Smidth & Co.)

After grinding, the clay slurry is stored in an 80-ft. diameter concrete tank having 20-ft. vertical sides and provided with air and mechanical agitation. The storage tank is located near the slurry storage tanks at the kiln level.

Limestone Production

Limestone is excavated by a No. 120-B Bucyrus-Erie electric shovel, equipped with a 5-cu. yd. dipper and supported on crawler treads. The quarry face is maintained about 30 ft. in height and no primary drilling or shooting is required. A very small amount of secondary shooting is necessary.

Plan view of Permanente's new cement plant, from quarry storage reclaiming conveyors to pack house



View of mill room, looking toward raw grinding end, showing two primary and two secondary ball mills, bowl classifiers and rake classifiers, and one of the finish mills in the foreground. Inset shows the finish grinding mills

The shovel serves a hopper over and part of, a 36-in. pendulum belt conveyor. The conveyor discharges to a second 36-in. conveyor which delivers the rock to a stacking, or field, conveyor by which the rock is put into the stock pile ahead of the crusher. The general plan of the plant shows the arrangement of these conveyors and illustrates the simplicity and economy of rock production. No attendance is required between the shovel and the crusher except for an occasional inspection. The pendulum conveyor and second conveyor are portable and are moved as the excavation progresses.

Under the stock pile, in a concrete tunnel, is a 36-in. belt conveyor which acts as a feeder for the crusher. A pan feeder regulates the feed from the stock pile on to the tunnel conveyor and a Merrick Weightometer on the belt conveyor weighs the rock crushed and also regulates the gate above the pan feeder so as to maintain a uniform and constant weight of material delivered to the crushing plant.

The crushing plant consists of a vibrating screen and a 24-in. x 36-in. Farrel-Bacon jaw crusher. The production of rock is 1000 tons per hour, all of which passes a 5-in. square opening. The throughs from the screen and the discharge from the crusher drop directly to a 36-in. conveyor where it is started on its way to the plant, more than a mile away.

One of the outstanding features of the Permanente project is the use of belt conveyors. Practically all conveying in the entire plant, except for cement, is by means of rubber belt conveyors. (Chain Belt idlers and Goodyear belting.)

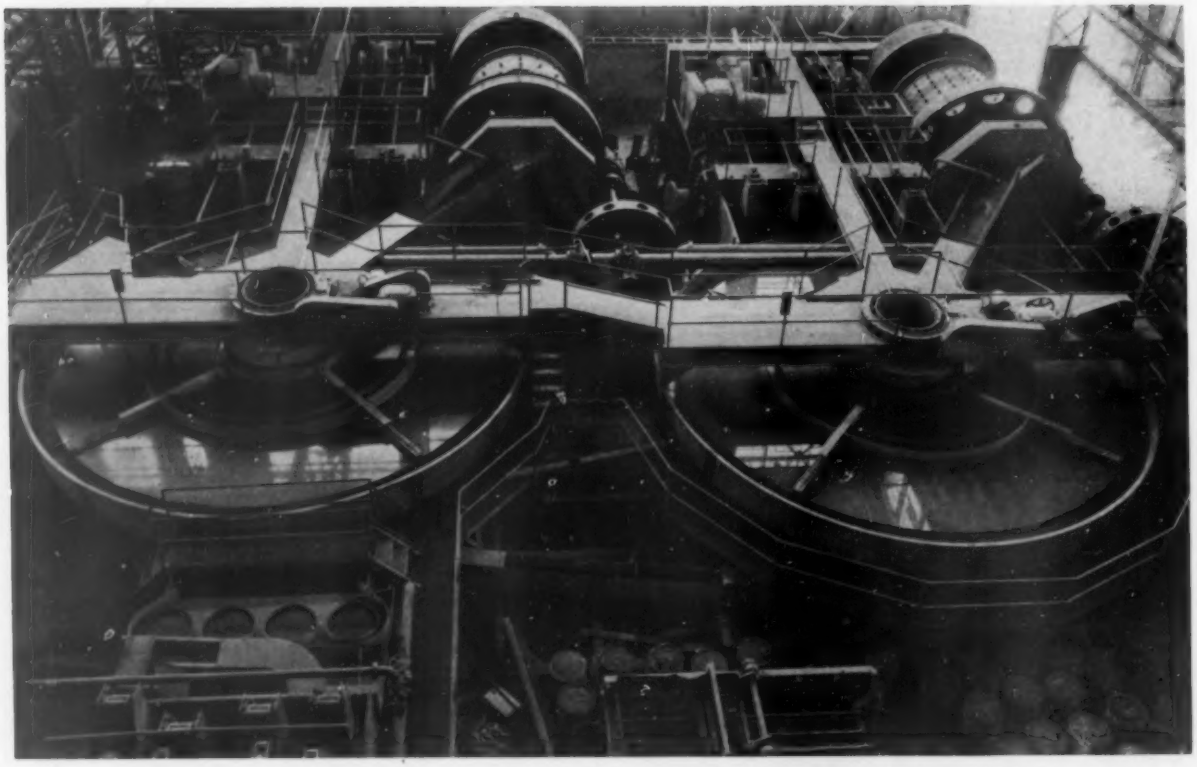
Leading from the quarry crushing plant are three 36-in. belt conveyors in series, so laid as to best suit the contours of the country. The conveyor system from the crushing plant to the lower terminal has a drop in elevation of over 600 ft. in the little more than a mile of travel. Each of the three conveyor units is driven by a 200-hp. electric motor. These motors are needed only when starting. After the conveyor is moving with a load, the motor acts as a generator and, as such, acts as a speed regulator. The regenerated current from the motors being driven by the conveyors is put back into the electrical system and is a power credit.

At the lower end of these conveyors is a vibrating screen that separates the rock, plus and minus 3 in. in size. The plus 3-in. material is delivered by belt conveyors to the sugar rock storage pile, which has a storage capacity of 97,000 tons. The minus 3-in. material is delivered by a belt conveyor to the cement rock storage pile, which has a storage capacity of 500,000 tons.

From these two storage piles limestone is drawn for cement, sugar rock and commercial crushed stone. By means of belt conveyors, which are shown on the general plant layout, limestone can be delivered to the various stations where it may be recrushed, washed and sized as desired.

Cement Plant

The cement plant, as first built, had a designed capacity of 7000 bbl. per day, consisting of two kilns and necessary grinding machinery. When this plant was put into operation at the beginning of 1940, and it was found that the materials and the en-



Two bowl classifiers in closed circuit with ball mills grinding to 96 percent minus 200 mesh

gineering were proper for making any kind or quality of portland cement, the company authorized the installation of a third unit, making it a three-unit plant having a capacity of 11,000 bbl. per day. This third unit addition began operating in September, 1940, and the description and data given herein is for the three-unit plant as is now operating.

In general, the plant is of the wet process and employs closed-circuit grinding in both the raw and finish grinding departments. Ground limestone and clay are blended together in the blending tanks by air agitation, and the slurry thus made is thereafter continuously agitated in the storage tanks by means of both air and mechanical agitation.

Raw Grinding Department

Under the cement rock storage, described above, is a concrete tunnel in which is a belt conveyor which delivers rock to the secondary rock crushing plant. Two secondary crushers are in service. One is a Kennedy-Van Saun No. 49 fine reduction gyratory crusher, with a belt drive from a vertical motor. The other secondary crusher is a Symons cone crusher. Both of these crushers are in closed circuit with screens and the rock prepared for cement manufacture is ½ in. and under. Between the crushers and the mill is a surge pile from which the crushed rock is conveyed by belt conveyor to both the 400-ton mill feed bins.

There are two primary, raw grinding, ball mills, each driven by a 500-hp. synchronous motor and each fed by a Merrick Feedoweight. Each mill is in closed circuit with a rake classifier.

One ball mill, 9-ft. x 11-ft. 6-in., supplied by F. L. Smidth & Co., is supported on one trunnion bearing and one slide shoe bearing.

One ball mill, 9½-ft. x 10-ft., made by the Traylor Engineering & Manufacturing Co., is supported on two trunnion bearings.

Each classifier is 12-ft. x 31-ft. 6-in. These were supplied by the Dorr Co.

Directly following the raw ball mills are two secondary raw ball mills, each in closed circuit with a Dorr bowl classifier, 30 ft. in diameter.

One of the secondary mills is a duplicate of the primary ball mill supplied by the Traylor Engineering & Manufacturing Co.; the other secondary ball mill is 9½-ft x 10-ft., supplied by the Allis-Chalmers Manufacturing Co., supported on two trunnion bearings.

The overflow from the primary rake classifiers can be delivered to either bowl classifier, but usually one primary and its secondary mill work as a unit. The underflow from the bowls is the feed to the secondary mills and the overflow from them is the finished ground limestone for making the cement mix after it has been dewatered in thickener tanks.

All the ground limestone pumped from the bowl classifiers, is dewatered in two 150-ft. diameter thickener tanks, supplied by the Dorr Co. The thickener overflow is pumped into the mill stream, or into the dirty water pond, and the thickener underflow goes to the blending tanks.

When operating the beneficiation plant, the beneficiated limestone from the cell house is sent to the secondary mills and then into the thickener tanks for dewatering.

Beneficiation Plant

The flotation process requires the stone to be ground to 60-mesh only, and the treatment is performed after the stone passes through the preliminary raw mill, and before it passes through the secondary raw mill.

The overflow from the rake classifiers is pumped to two 45-ft. diameter hydro-separators. The overflow from the hydro-separators, containing the silt and extreme fines, goes directly to the thickeners. The hydro-separator underflow goes to a 23-ft. x 23-ft. tank containing a 60-in. x 50-in. Dorr Quadruplex Turbo Mixer, where it is thoroughly mixed with water.

(Continued on page 49)

ROTARY KILNS

UNAX KILNS
FOR
LIME BURNING

UNAX KILNS
FOR
CEMENT

SINTERING KILNS
FOR ORES, PHOSPHATES, ETC.

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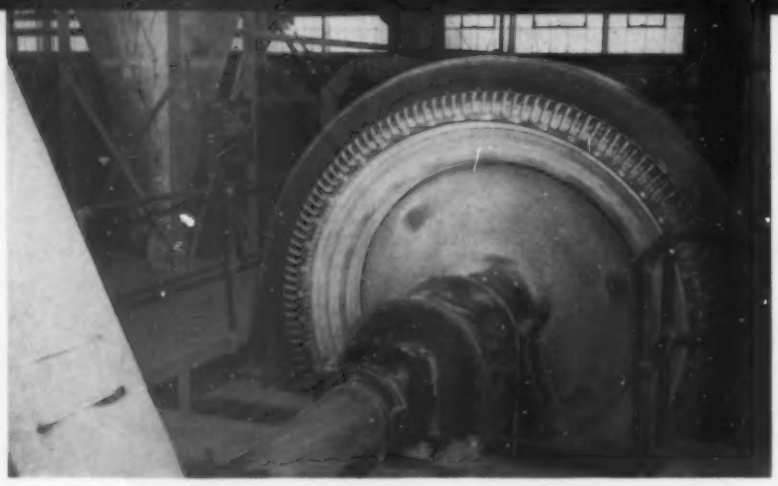
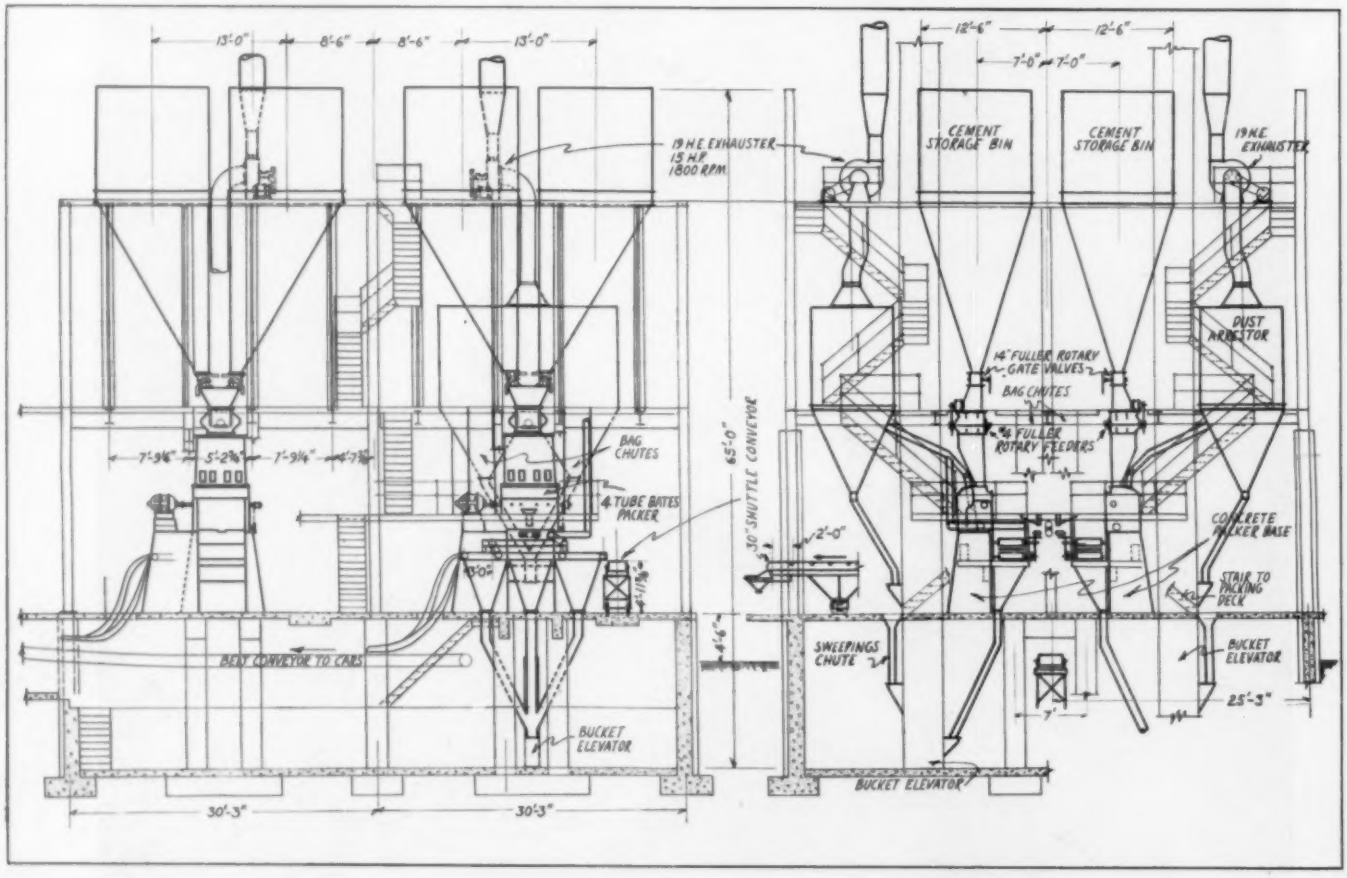


A 1000-hp. synchronous motor direct connected to pinion shaft on clinker grinding mill



Above: Elevation details of pack house

Left: General view showing thickeners, mill room, clinker storage, and to the left, reclaiming conveyor from quarry stockpile

FROM QUARRY TO PACK HOUSE

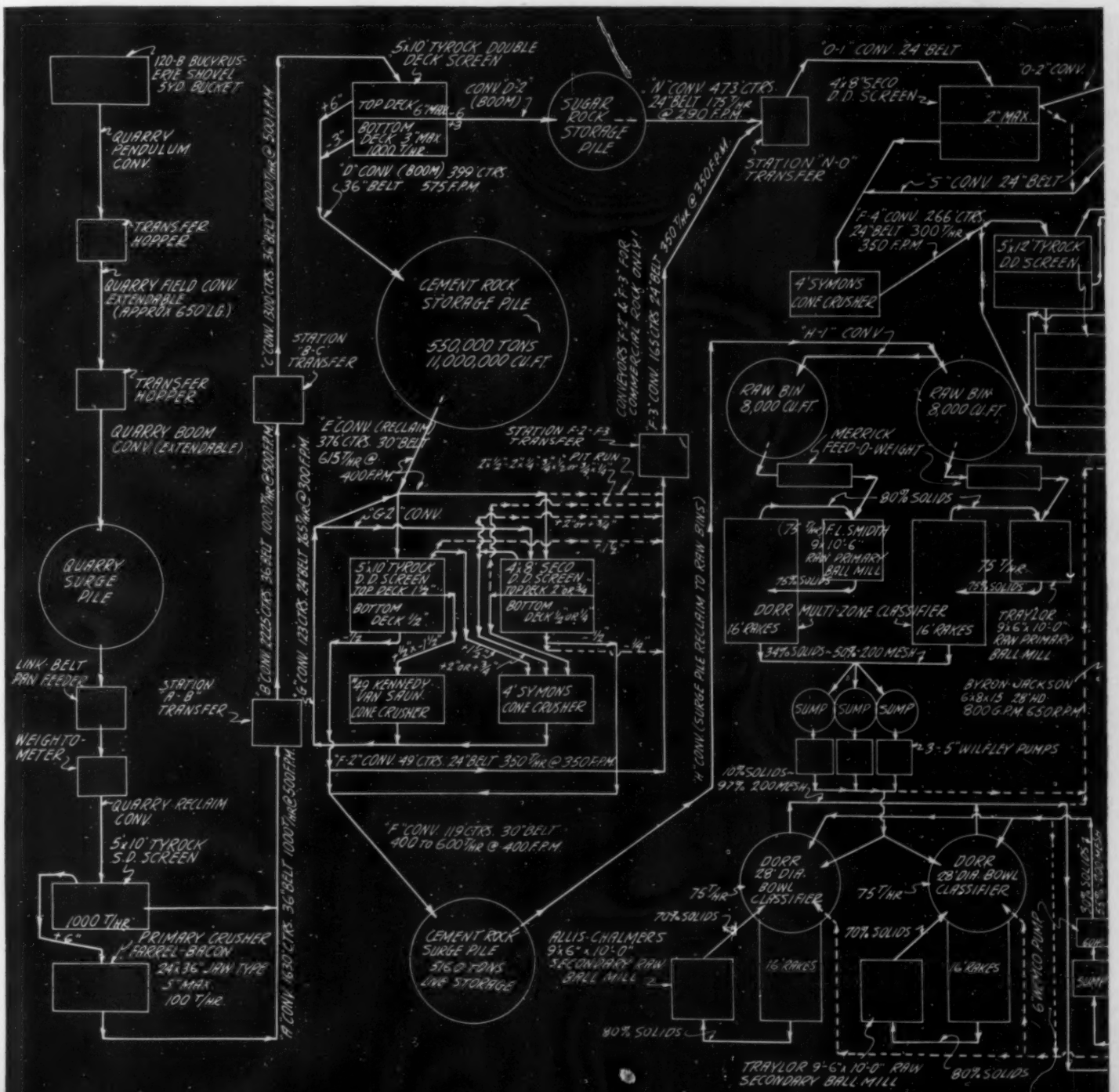
EVERY step in the production of cement, crushed stone, and lime at The Permanente Corporation's new plant near San Jose, Calif., may be followed by referring to the flow sheet of operations and the plant and quarry views shown on these pages.

For the busy executive who wishes to make a study of the newest cement plant in the United States without reading all the operating details, the flowsheet is a convenient reference to all the salient points of interest.

For a complete picture of all the unusual operating features, the reader will find the article by Mr. Stevenson, in which this insert section is enclosed, an excellent source of information. The author is particularly qualified as he is the consulting engineer who took a prominent part in the design of the plant.

Left: Cement rock storage and part of sugar rock storage showing arrangement of conveyors

Below—Flow sheet of cement plant, sugar rock, commercial stone, and lime plant operations


120-B BUCYRUS-ERIE SHOVEL 5 YD. BUCKET
QUARRY PENDULUM CONV.
TRANSFER HOPPER
QUARRY FIELD CONV. EXTENDABLE (APPROX 650' LG.)
TRANSFER HOPPER
QUARRY BOOM CONV. (EXTENDABLE)
QUARRY SURGE PILE
LINK-BELT PAN FEEDER
WEIGHTO-METER
QUARRY RECLAIM CONV.
5'x10' TYROCK S.D. SCREEN
1000 T/HR.
PRIMARY CRUSHER FARREL-BACON 24"x36" JAW TYPE 5" MAX. 100 T/HR.
STATION A-B TRANSFER
STATION B-C TRANSFER
"A" CONV. 1650' CTRS. 36" BELT 1000 T/HR @ 500 F.P.M.
"B" CONV. 1800' CTRS. 36" BELT 1000 T/HR @ 500 F.P.M.
"C" CONV. 2225' CTRS. 36" BELT 1000 T/HR @ 500 F.P.M.
"D" CONV. (BOOM) 399' CTRS. 36" BELT 575 F.P.M.
"D-1" CONV. 24" BELT
"D-2" CONV. (BOOM)
5'x10' TYROCK DOUBLE DECK SCREEN
TOP DECK 6" MAX.
BOTTOM DECK 3" MAX. 1000 T/HR.
SUGAR ROCK STORAGE PILE
"N" CONV. 473' CTRS. 24" BELT 173 T/HR @ 290 F.P.M.
STATION "N-O" TRANSFER
"O-1" CONV. 24" BELT
"O-2" CONV.
4'x8' SECO D.D. SCREEN
2" MAX.
"5" CONV. 24" BELT
CEMENT ROCK STORAGE PILE
550,000 TONS
11,000,000 CU. FT.
"E" CONV. (RECLAIM) 376' CTRS. 30" BELT 615 T/HR @ 400 F.P.M.
"E-1" CONV. 133' CTRS. 24" BELT 165 T/HR @ 300 F.P.M.
STATION F-2-F-3 TRANSFER
PIT RUN
"G-2" CONV.
5'x10' TYROCK D.D. SCREEN TOP DECK 1½" BOTTOM DECK ½"
4'x8' SECO D.D. SCREEN TOP DECK 2 OR ¾" BOTTOM DECK ½" OR ¼"
49" KENNEDY-VAN SAUN CONE CRUSHER
4' SYMONS CONE CRUSHER
"F-2" CONV. 49' CTRS. 24" BELT 350 T/HR @ 350 F.P.M.
"F" CONV. 119' CTRS. 30" BELT 400 TO 600 T/HR @ 400 F.P.M.
CONVEYORS F-2 & F-3 FOR COMMERCIAL ROCK ONLY
F-3" CONV. 165' CTRS. 24" BELT 350 T/HR @ 350 F.P.M.
"H" CONV. (SURGE PILE RECLAIM TO RAW BINS)
CEMENT ROCK SURGE PILE 516 @ TONS LIVE STORAGE
ALLIS-CHALMERS 9'x6"x10'-0" SECONDARY RAW BALL MILL
"F-4" CONV. 266' CTRS. 24" BELT 300 T/HR. 350 F.P.M.
4' SYMONS CONE CRUSHER
5'x12' TYROCK D.D. SCREEN
"H-1" CONV.
RAW BIN 8,000 CU. FT.
RAW BIN 8,000 CU. FT.
MERRICK FEED-O-WEIGHT
80% SOLIDS
(73 T/HR.) F.L. SMIDTH 9'x10'-6" RAW PRIMARY BALL MILL
75 T/HR.
25% SOLIDS
DORR MULTI-ZONE CLASSIFIER
16' RAKES
34% SOLIDS - 50% -200 MESH
TRAYLOR 9'x6'x10'-0" RAW PRIMARY BALL MILL
BYRON-JACKSON 6"x8"x15 28" HD. 800 G.P.M. 650 R.P.M.
SUMP
SUMP
SUMP
2-5" WILFLEY PUMPS
10% SOLIDS - 97% 200 MESH
DORR 28' DIA. BOWL CLASSIFIER
75 T/HR.
70% SOLIDS
DORR 28' DIA. BOWL CLASSIFIER
75 T/HR.
70% SOLIDS
16' RAKES
16' RAKES
80% SOLIDS
6" MYNCO PUMP
TRAYLOR 9'-6"x10'-0" RAW SECONDARY BALL MILL
80% SOLIDS

New HIGH EFFICIENCY In HANDLING SLURRIES

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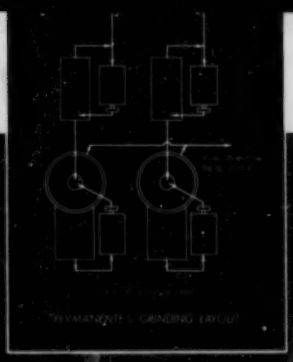
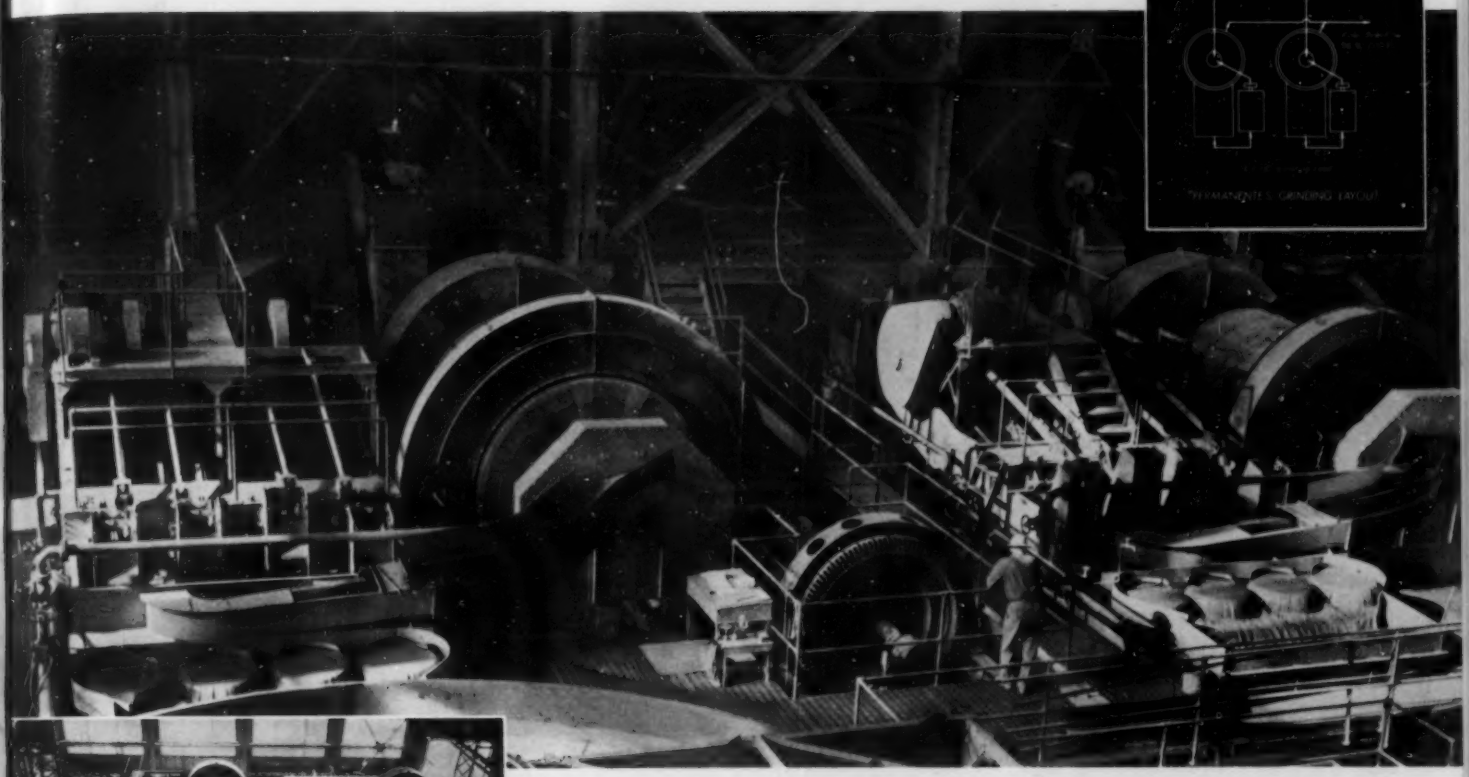
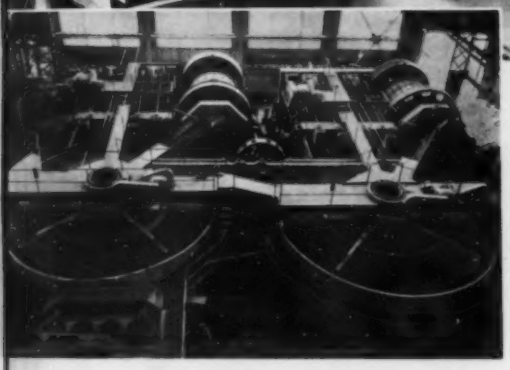
PERMANENTE SETS RECORD—







Step 1—2 Dorr FX Classifiers, each 12 ft. wide, in closed circuit with two 9'6" x 10'0" ball mills, grinding to 48 percent minus 200 mesh.

Step 2—2 Dorr FX Bowl Classifiers, each 16 ft. wide with a 28 ft. dia. bowl, in closed circuit with two 9'6" x 10'0" ball mills, grinding to 96 percent minus 200 mesh.

3—3¼ K.W.H./BBL. FOR RAW GRINDING

★ The Dorr C.C.G. (Closed Circuit Grinding) System at the Permanente Corp.'s 12,000 bbl. plant at Permanente, Cal., is grinding 1" rock to 96 per cent minus 200 mesh for 3.00 to 3.25 K.W.H. per barrel—about 1/2 to 2/3 the average for the industry.

Eight installations of this type have demonstrated power and other savings that you can't afford to overlook if you are about to build a new plant, modernize an old one or shift from dry to wet processing.

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A 15-page reprint on Dorr C.C.G. is yours for the asking—flowsheets, operating data, cost analyses, etc.

Step 3—2 Dorr Thickeners, each 150 ft. dia., thickening bowl classifier overflow to slurry density.

Step 4—3 Dorr Slurry Mixers, each 80 ft. dia., correcting and storing thickened slurry ahead of the rotary kilns.

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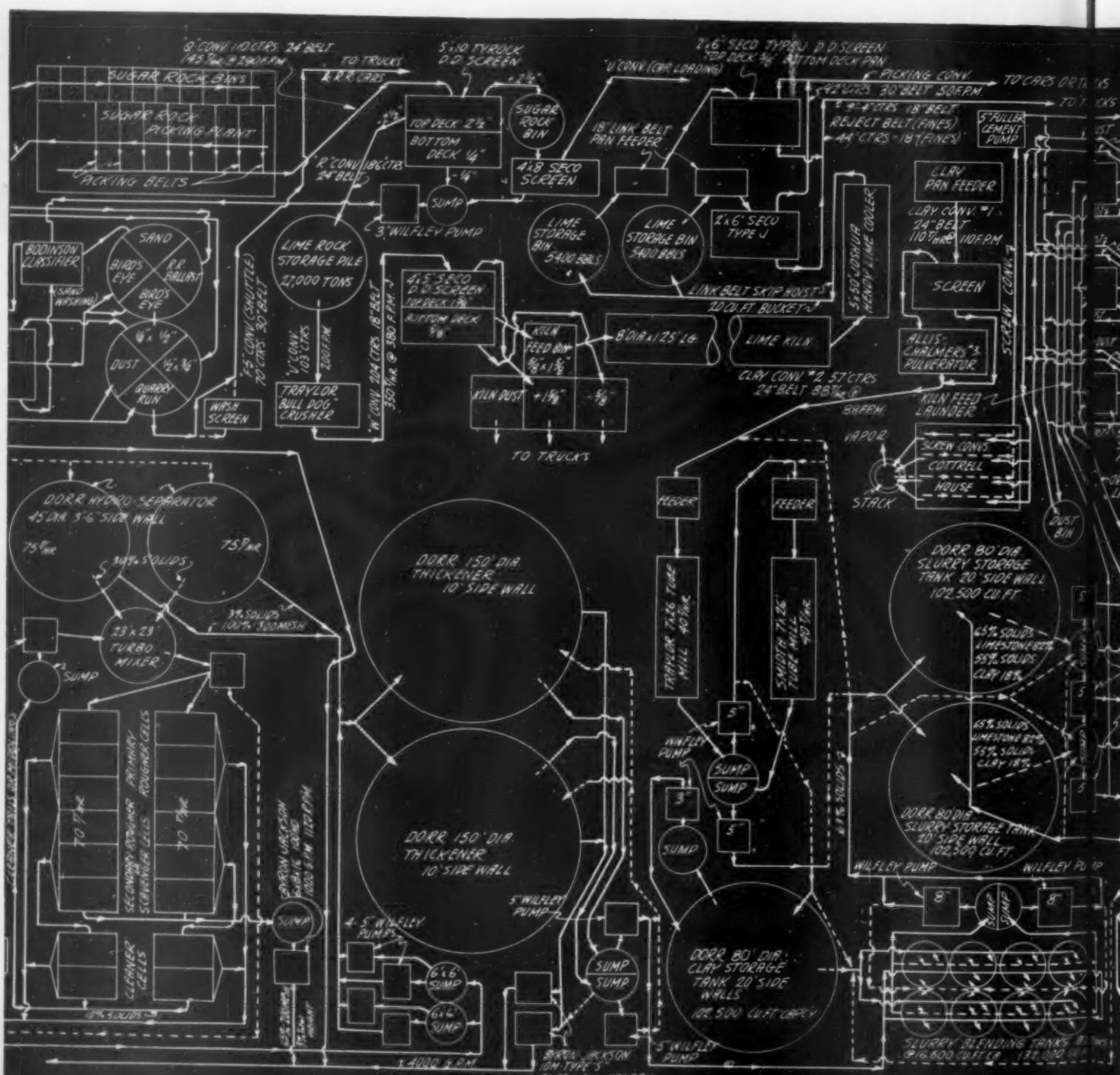
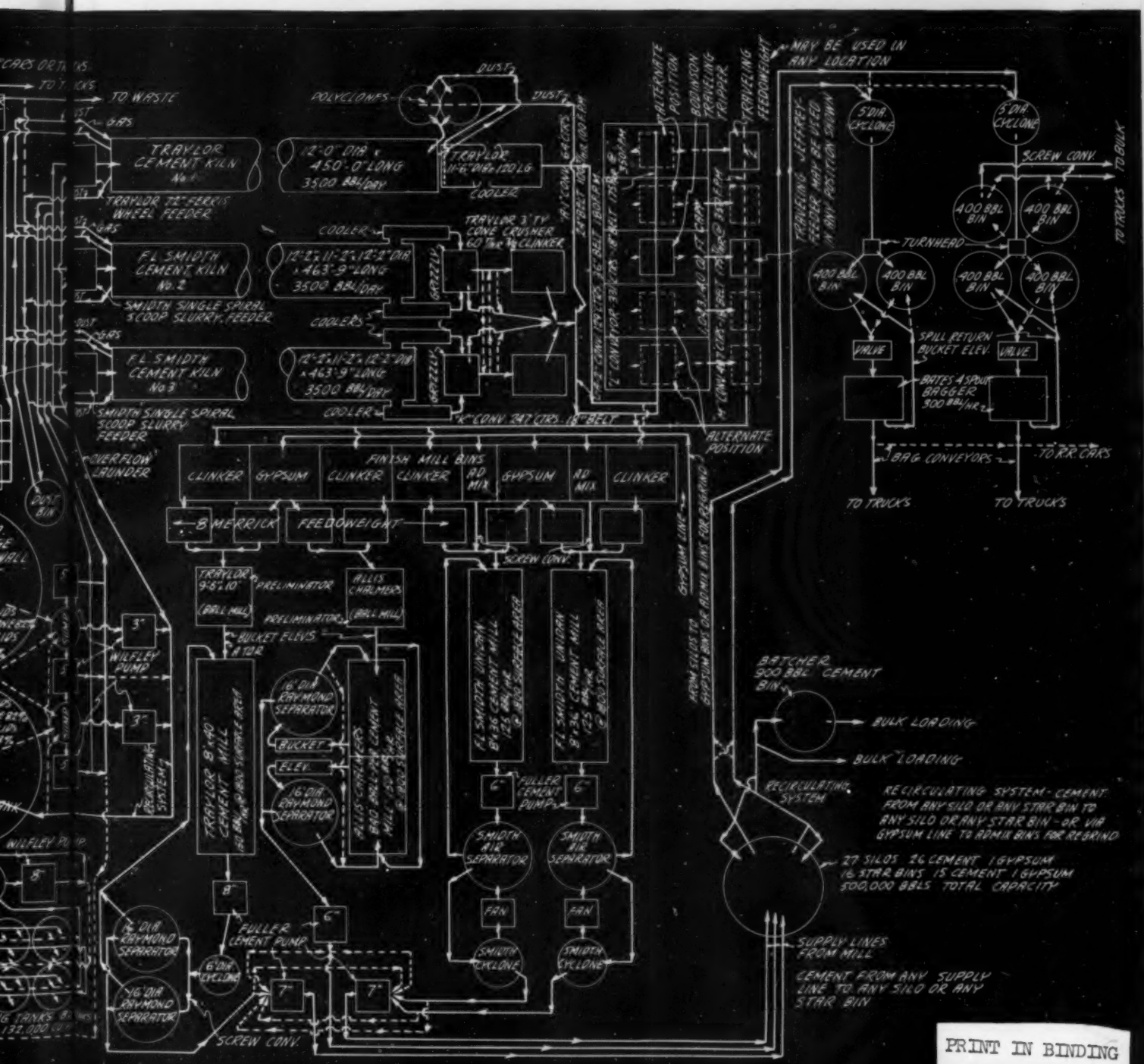
ITALY: S.A.I. Dorr-Oliver, Milan • JAPAN: Sanki Eng. Co., Ltd., Tokyo • SCANDINAVIA: A.B. Hedemora, Hedemora, Sweden • AUSTRALIA: Crossle & Duff Pty. Ltd., Melbourne
ARGENTINA: Luis Fiore, Buenos Aires • SOUTH AFRICA: Edward L. Bateman Pty. Ltd., Johannesburg • BRAZIL: Oscar Taxes & Co., Rio de Janeiro

Left: Sugar rock picking plant where material is selected for the sugar refining industry

Right: Junction of field conveyor with pendulum type conveyor. Arrangement permits movement of conveyors to new location

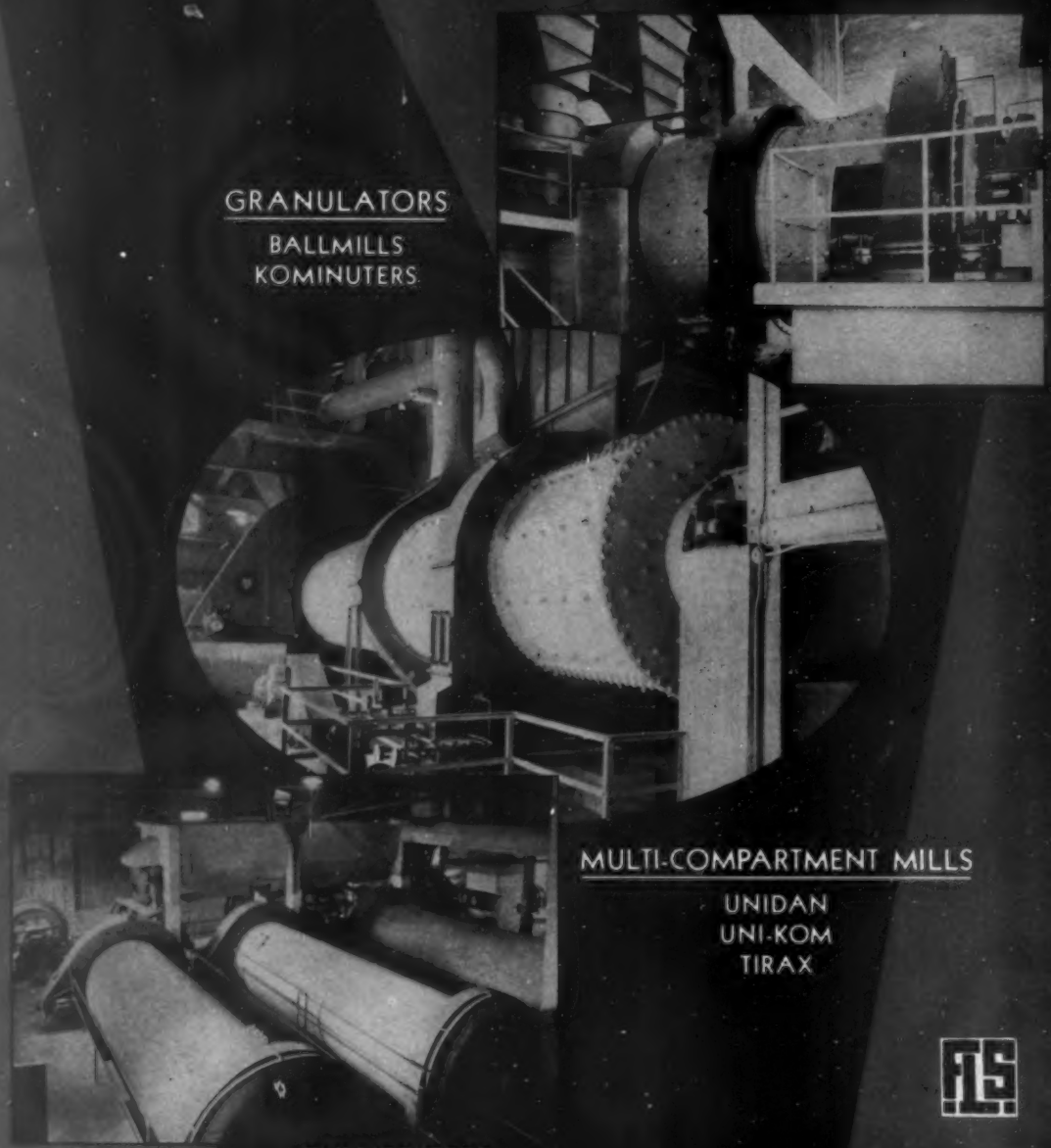


Electric shovel loading quarry rock into hopper of pendulum type conveyor for transfer to field conveyor


TO WASTE
DUST
POLYCLONES
TRAYLOR CEMENT KILN No. 1
12'-0" DIA x 450'-0" LONG 3500 BBL/DAY
TRAYLOR 72" FERRIS WHEEL FEEDER
TRAYLOR 3' TV CONE CRUSHER 60 TPH ¾" CLINKER
F.L. SMIDTH CEMENT KILN No. 2
12'-2", 11'-2", 12'-2" DIA x 463'-9" LONG 3500 BBL/DAY
SMIDTH SINGLE SPIRAL SCOOP SLURRY FEEDER
COOLERS
GRIZZLY
F.L. SMIDTH CEMENT KILN No. 3
SMIDTH SINGLE SPIRAL SCOOP SLURRY FEEDER
"OVERFLOW" LAUNDER
DUST BIN
MAY BE USED IN ANY LOCATION
ALTERNATE POSITION
TRAVELING JEFFREY FEEDER MAY BE USED IN ANY POSITION SHOWN
5' DIA. CYCLONE
SCREW CONV.
TO BULK
TO TRUCKS
400 BBL BIN
TURNHEAD
VALVE
SPILL RETURN BUCKET ELEV.
BATES 4 SPOUT BAGGER 900 BBL/HR
BAG CONVEYORS
TO R.R. CARS
TO TRUCKS
CLINKER
GYPSUM
FINISH MILL BINS
AD MIX
MERRICK FEEDOWEIGHT
SCREW CONV.
TRAYLOR 9'-6"x10" (BALL MILL)
PRELIMINATOR
ALLIS CHALMERS (BALL MILL)
BUCKET ELEVATOR
WILFLEY PUMP
RECIRCULATING SYSTEM
TRAYLOR 8'x40' CEMENT MILL
16' DIA RAYMOND SEPARATOR
BUCKET ELEV.
ALLIS CHALMERS 8'x30' CEMENT MILL
F.L. SMIDTH UNIDRIVE 8'x36' CEMENT MILL
F.L. SMIDTH UNIDRIVE 8'x36' CEMENT MILL
FULLER CEMENT PUMP
SMIDTH AIR SEPARATOR
FAN
SMIDTH CYCLONE
GYPSUM LINE
FROM SILOS TO GYPSUM BINS OR ROMIL BINS FOR REGRIND
BATCHER 900 BBL CEMENT BIN
BULK LOADING
BULK LOADING
RECIRCULATING SYSTEM
RECIRCULATING SYSTEM - CEMENT FROM ANY SILO OR ANY STAR BIN TO ANY SILO OR ANY STAR BIN - OR VIA GYPSUM LINE TO ROMIL BINS FOR REGRIND
27 SILOS 26 CEMENT 1 GYPSUM
16 STAR BINS 15 CEMENT 1 GYPSUM
500,000 BBLS TOTAL CAPACITY
SUPPLY LINES FROM MILL
CEMENT FROM ANY SUPPLY LINE TO ANY SILO OR ANY STAR BIN
6' DIA CYCLONE
SCREW CONV.

PRINT IN BINDING

GRINDING MILLS



GRANULATORS

BALLMILLS
KOMINUTERS

MULTI-COMPARTMENT MILLS

UNIDAN
UNI-KOM
TIRAX

FLS

PULVERIZERS

TUBEMILLS
ATOX MILLS

F. L. SMIDTH & CO.

60 EAST 42ND STREET ENGINEERS NEW YORK, N. Y.

From the turbo mixer the material is pumped to the flotation cells.

In the cell house are two batteries of flotation cells, supplied by the Separation Process Co. and made by the American Cyanamid Co. Each battery consists of eight Type SS-66-in. Fagergreen machines. Six of these eight cells are in series for primary work; the material being treated successively in all six. Limestone is floated and the chert becomes the rejects. After passing through the six primary treatment cells, the rejects pass to two additional scavenger cells, working in series, to further clean the tailings. The floated limestone is now pumped to the bowl classifiers, in circuit with the secondary raw mills, and the final grinding and disposition of it is the same as when no treatment of the stone is necessary.

Blending Tanks

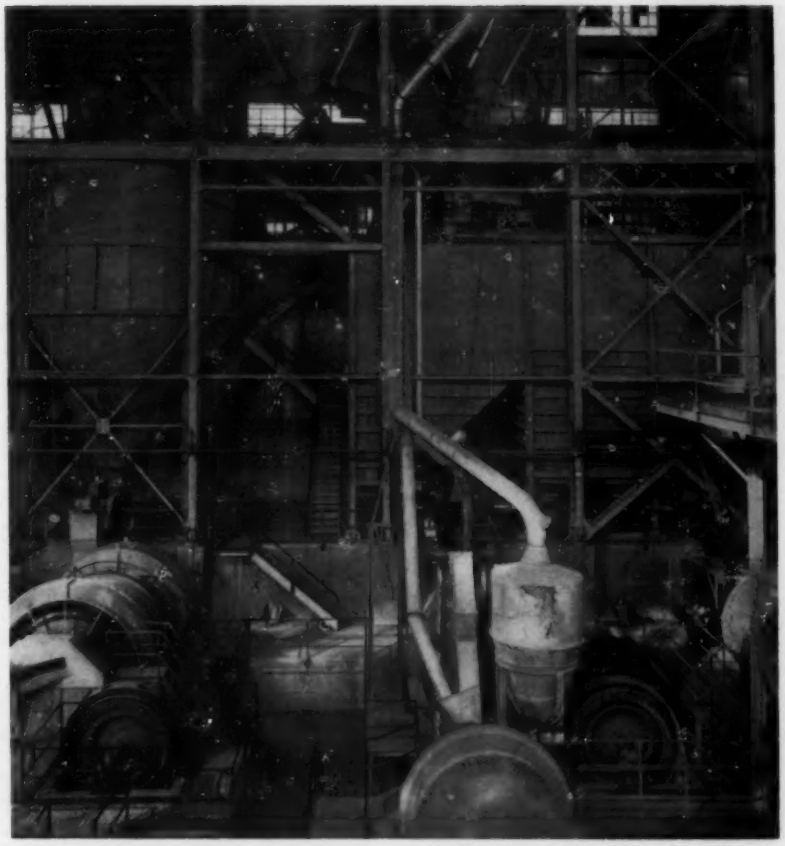
Eight steel tanks, 20-ft. diameter by 40-ft. deep, made with conical bottoms, are used for mixing and blending the raw materials into slurry for kiln feed. Air agitation is used exclusively for agitation in the blending tanks. The air agitation is controlled by an F. L. Smidth & Co. pneumatic air distributor. By this means, each tank is violently agitated for a specified time and then the air is cut off from that tank and another tank is violently agitated. The use of this automatic air distributor gives good agitation and mixing with a minimum of air required.

From the blending tanks, finished slurry is pumped to two 80-ft. slurry storage tanks located in the kiln department, which serve for slurry storage and also for kiln feed tanks. These slurry tanks have 20-ft. vertical sides and are agitated by air and mechanical equipment.

Kilns

Three rotary kilns constitute the burning equipment. One is a straight kiln, manufactured by the Traylor Engineering & Manufacturing Co., 12 ft. in diameter by 450 ft. long. Following the kiln is a rotary cooler 11-ft. 6-in. diameter by 120 ft. long. Feeding the kiln is a 72-in. ferris wheel feeder. The rotary cooler is lined with brick for 40 ft. of its length. The entire interior of the cooler, including the brick-lined section, is equipped with lifters.

A Cheesman burner system draws air through the cooler and then through two polyclones, made by the Western Precipitation Co. In the polyclones, most of the entrained dust is collected and sent direct to clinker storage. Part of the hot cleaned air, which has passed through the coolers



Showing relative location of separators to clinker grinding mill. On the left is a preliminary raw mill with its feed bin and the Feedoweight underneath

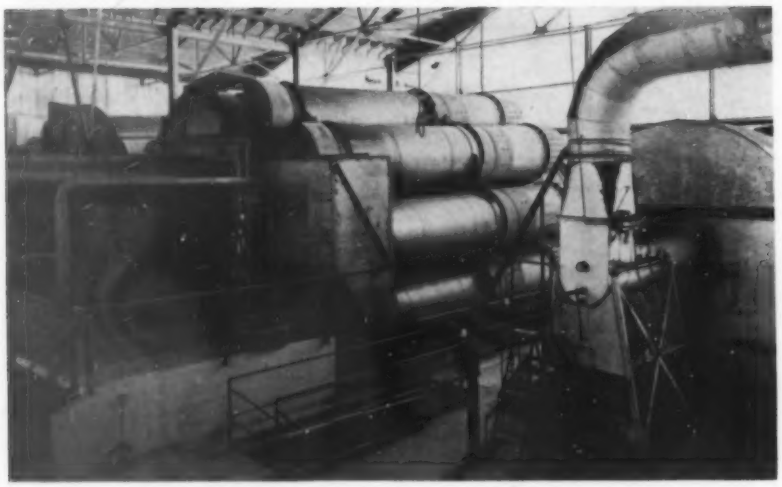
and polyclones, is blown through the burner and into the kiln. This hot air passing through the burner, constitutes all the combustion air requirements, both primary and secondary.

Two Unax kilns, made by F. L. Smidth & Co., are 11-ft. diameter by 464 ft. long. Both these kilns are enlarged at both ends to 12-ft. diameter. Each kiln is equipped with ten 5-ft. diameter coolers which rotate with the kiln. Each cooler has five feet of its length lined with brick and the rest of the coolers are equipped with chains for a better heat transfer. Each Unax kiln is fed by a Smidth rotary scoop feeder.

The interior of each of the three kilns is lined with brick throughout the kiln length. In the burning zone, 9-in. magnesite bricks are installed, but in the remainder of the shell, fire bricks are used which have the required quality for the service. Throughout the calcining zone, for a distance of approximately 200 ft., a 3-in. layer of Johns-Manville asbestos blocks are laid between the shell and the fire brick lining.

The Unax coolers discharge clinker at the top of the rotating cycle and the clinker from both kilns come together in common chutes above two 4-ft. T. Y. Traylor reduction crushers. Each crusher is driven by a short belt from a motor resting on a Rockwood base. Grizzley bars in the chutes above the crushers remove all clinker which does not need to be crushed and only the oversize from the grizzley passes through the crushers. All the clinker passing the grizzley as well as the discharge from the crushers, drops to a belt conveyor, which transports it to the clinker storage. To insure against bearing trouble from heat, the crusher gear case lubricating oil is circulated through a tubular water cooler which maintains the oil in proper working condition. One crusher only is in service at one time, a spare being available at all times to insure continuous kiln operation.

Each of the two kilns is driven by a 200-hp. direct-current motor and the third kiln is driven by a 200-hp. "B.T.A. (brush shifting) motor." The direct-current motors were made by the Westinghouse Electric Manufacturing Co. and the B.T.A. motor by the General Electric Co. The Traylor kiln is driven through a belt from the motor supported on a Rockwood base. Each of the Unax kilns is di-



Kiln room showing firing end of three kilns

rectly connected to the motor through speed-reducing gears.

Kiln feeders are driven by synchronous motors which are synchronized with the kiln motor to insure a constant ratio of kiln speed to feeder speed. The ratio between kiln and feeder speeds may be altered; but when set, remains constant until readjusted.

Each kiln is equipped with chains; the Unax having the Smidth draped chain system and the Traylor kiln, individual chains fastened to the shell at one end of the chain. Each of these individual chains is 8-ft. 6-in. long.

The draft for each kiln is produced by an F. L. Smith No. 54 fan, made by the Buffalo Forge Co. and driven by a 150-hp. motor, through a silent chain.

The smoke boxes, commonly called dust chambers, are of steel plate and are not brick lined. In the outlet from smoke box to the fan is a louvre damper, which is operated by the burner at the firing end of kiln.

On the burner floor are control panels, from which the operator controls all units of the kiln department. Here is recorded the temperature of the exit gases, temperature of air from the rotary cooler, kiln revolutions per hour, the total kiln revolutions, CO_2 and CO percent of the exit gases, voltage and amperes of the kiln motors and the fuel gas consumption. The control panel is equipped with lights to indicate when the different units are operating, or are not operating, and a telephone from the burning floor to the feed house. The control of the kiln from the control panel makes it possible for the operator to perform much of his work with his back to the kiln.

Control panels were supplied by F. L. Smidth & Co., the instruments being manufactured by the following companies: integrating and recording gas flow meters, the Foxboro Co.; indicating and recording exit stack gas instruments, Leeds and Northrup Co.; kiln revolutions per hour meter, Weston Electrical Instrument Co.; indicating draft gage, The Hayes Corp.; and gas analyzing instruments, Bacharach Industrial Instrument Co., and Siemens and Halske Co.

Natural gas is piped from the oil fields to the plant and is used for fuel in the cement and lime kilns. This gas has a heating value of over 1100 gross B.t.u. per cu. ft. and is supplied by the Pacific Gas and Electric Co. A stand-by oil burning installation, including oil storage, boiler and burners, makes it possible to burn oil at any time there is a shortage of gas fuel; and the change from one fuel to the other requires but a few minutes.

Dust liberated by the crushers and the clinker chutes is drawn through an automatically self-cleaning bag dust collector which is located near the clinker storage building. This dust collector also collects the dust liberated when filling the mill feed bins and from the top and bottom of the clinker storage.

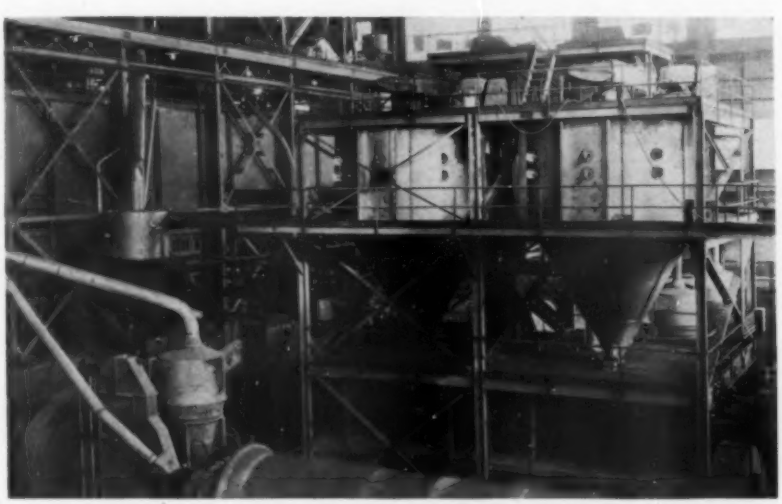
Cottrell Precipitator

The Cottrell electrical precipitating dust collecting house is of concrete and steel and has four parallel chambers through which the kiln gases pass. Each chamber is equipped with five units, or sections, of electrodes in series. The required rapping of the electrodes is done by a manually operated pneumatic hammer.

Dust collected in the hoppers below the electrodes is conveyed by screw conveyors and a Fuller-Kinyon pump to the kiln feed house, where it is returned to the kilns as part of the kiln feed. When necessary, the Fuller-Kinyon pump delivers the dust into a canyon as waste material.

Slurry from the kiln feeder is introduced tangentially into a circular receptacle just above the feed pipe. The tangential intake produces a swirling motion of the slurry and the dust is introduced at the side of the circular receptacle, where it is mixed with the slurry feed and becomes wetted. The combined slurry and dust drop into the kiln together.

The draft fans below the kiln exit gases into the Cottrell dust precipitator house so as to produce a neutral pressure at the intake end of the Cottrell house. A concrete unlined chimney, 18 ft. 6 in. minimum diameter and 225 ft. high, above the base, produces the necessary draft through the Cottrell house and delivers the gases to the atmosphere. The chimney (and the silos) was built by the Rust Engineering Company.



Two separators mounted directly over a clinker grinding mill to save room

The clinker storage is a concrete and steel structure completely housed in and roofed over. It is about 100 ft. wide and 340 ft. long. The lower part, of concrete, is V-shaped, set in an excavation with the bottom sloping to a concrete tunnel underneath. The sloping bottom walls come up to the surface of the ground and then extend vertically several feet, at which level the walls act as a support for the steel superstructure. The concrete structure is divided into five compartments by concrete partition walls, providing storage for five different kinds of clinker.

The storage has a total capacity of 160,000 bbl. of clinker. The belt conveyor from the kiln room, above referred to as transporting clinker from the clinker crushers to the clinker storage, ends at the end of the clinker storage. At this location it discharges to either one of two belt conveyors. One of these conveyors delivers clinker to the mill feed bins and the other one runs the entire length of the clinker storage and delivers all clinker into the storage. The filling belt conveyor is at the top of the structure and is equipped with a movable tripper. From the tripper, two short belt conveyors deliver clinker to points about 18 ft. on both sides of the main conveyor. The storage is so wide that it is impracticable to fill it from the center of the building.

Underneath the main storage filling conveyor is a structural steel floor, through which the two short cross conveyors deliver the clinker into storage. The delivery chutes from the cross conveyors are tight fitting to the floor and any dust liberated by the tripper, or cross conveyors, is drawn into the cloth dust collector above referred to. This same dust collector also draws the dust laden air from the storage compartment under the floor and from several locations in the tunnel under the storage.

The tunnel contains a belt conveyor for unloading the clinker storage. Over this belt are two portable Merrick Feedoweights and one Jeffrey-Traylor vibrating feeder. By this arrangement clinker from different compartments may be blended and a record kept showing the actual proportions of the different clinkers which were blended. The tunnel conveyor is so arranged that it discharges to other conveyors which deliver the clinker directly to the mill feed bins or return it to another clinker storage compartment.

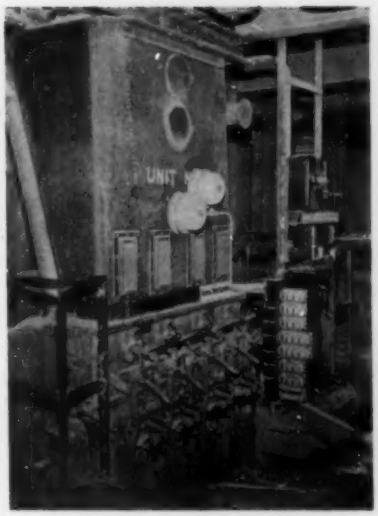
Clinker Grinding Department

Four clinker grinding mills do the finish grinding. These mills are in the same building as the raw grinding and clay grinding mills. The mill building is of mill type steel construction, covered with galvanized steel sheets and is about 135 ft. by 260 ft. On the side of the building next to the kiln department is a reinforced retaining wall 40 ft. high, as the kiln operating floor level is 56 ft. above the mill floor level. This wall acts as a support for the building along that wall, and the mill building is entirely closed.

Each of the four mills has its feed bin containing 1350 bbl. of cement clinker. There are two steel bins for gypsum, so arranged that each gypsum bin serves two grinding mills. Each mill is fed by two Merrick Feedoweights; one for clinker and one for gypsum. The Feedoweights are set at right angles to the center line of the mills and they come together and discharge into a short screw conveyor set on the mill center line. The screw conveyor discharges the mixture of clinker and gypsum directly into the feed end of the mill.

The four mills in this department are as follows:

One Traylor unit, consisting of a 9½-ft. x 10-ft. preliminary ball mill,

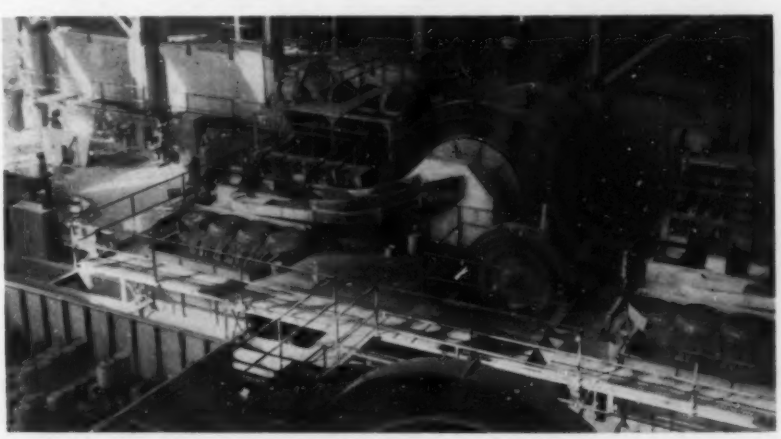


Four-tube packer with feed hopper

which is a duplicate of the raw grinding ball mills and an 8 ft. x 40 ft. secondary mill. A short bucket elevator delivers the material from the ball mill discharge to the feed end of the 8 ft. x 40 ft. secondary mill. This 8 x 40 ft. mill has two compartments and is driven by a 1000-hp. General Electric synchronous motor. The mill discharges into a Fuller-Kinyon pump which conveys the partially ground cement to two 16-ft. Raymond, Double Whizzer air separators, located above the mill feed bins. The separator rejects are dropped by gravity, through circular chutes, to the feed end of either the preliminary mill or the secondary mill.

One Allis-Chalmers unit comprises a 9½-ft. x 10-ft. preliminary ball mill followed by an 8 ft. x 40 ft. secondary mill. The transfer of cement from the preliminary to the secondary mill is by elevator, the same as for the Traylor unit. This 8 x 40 ft. mill driven by a 1000-hp. General Electric synchronous motor, is fed at both ends and has the discharge from each of the two compartments at the middle. The discharge from each compartment is into a bucket elevator, and each elevator delivers cement into a 16-ft. Raymond Double Whizzer air separator. Underneath the mill, in a concrete pit, is located the elevator boots and a Fuller-Kinyon pump.

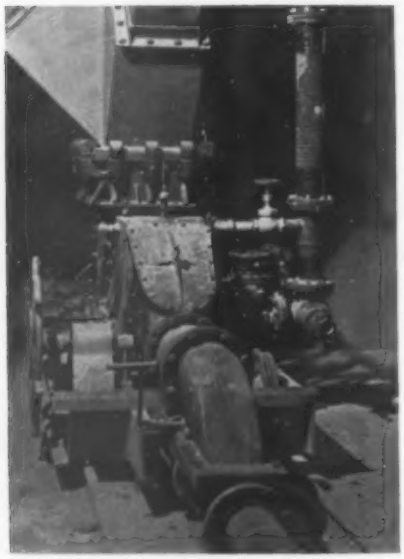
By means of distributing screw conveyors, the second compartment may be operated in open circuit or in closed circuit with its separator. Rejects from the first separator may be returned to the feed end of either the preliminator, or to the first compartment of the mill. The rejects from the second separator may be returned to the feed end of either the first or



One of the two primary raw grinding ball mills in closed circuit with rake classifier

Permanente

FULLER COST-SAVING EQUIPMENT



for

CEMENT PLANTS

All modern, up-to-date cement plants take full advantage of Fuller cost-saving equipment wherever possible to do so. For example, The Permanente Cement Corporation, Permanente, California, builders of the latest cement plant in the United States, installed the following Fuller-Kinyon equipment:

For conveying—

From mills to separators
Separators to silos
Silos to packers and bulk loading
Flue dust
Gypsum

Also

Rotary Valves
Air-cleaning equipment

Sample's Photo Service, San Jose, California

Also installed in this same plant are six Fuller Rotary Air Compressors, each furnishing air to a Fuller-Kinyon Pump. Five of these compressors are shown in illustration on the left, center.

The illustration on the left, bottom, shows an installation of three of eight Fuller Air-Quenching Coolers, installed by one of the large Eastern cement companies. A number of these coolers have been installed and many more are now on order to be installed in the near future. Fuller Coolers are efficient and cost-saving. They are comparatively low in first cost . . . require little maintenance, due to mechanical simplicity . . . high and uniform combustion air temperatures . . . drive mechanism simple; outside of cooler . . . power requirements low.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA
Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

G-18

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · AIR-QUENCHING COOLERS · BIN SIGNALS

second compartment. The finished product from either or both air separators may be discharged into the Fuller-Kinyon pump below, or the finished product from the first separator may be delivered to the feed end of the second compartment. The flexibility of this arrangement will permit experimental runs to determine the most efficient flow of the cement during grinding.

A Fuller-Kinyon pump delivers the finished cement directly to the stock house or to mixing conveyors above the feed bins, where it can be blended with the cement from other mills.

There are two F. L. Smidth 8-ft. x 36-ft. Unidan three-compartment mills, each driven by a 1000-hp. General Electric synchronous motor, and each mill is in closed circuit with an F. L. Smidth & Co. No. 250 Multi-Stage air separator. Each separator consists of the separator proper and a collecting cyclone in closed circuit with it, as well as a fan for producing the air needed for the closed circuit system. The separator is driven by a 40-hp. variable-speed motor and the fan by a 125-hp. motor.

The finished product from any of the four sets of air separators may be sent by Fuller-Kinyon pumps directly to the stock house or into mixing screw conveyors after which it is pumped to the stock house. The mixing screw conveyors are for the purpose of better blending the cement ground in the different mills, prior to their entry into stock-house storage.

Each of the clinker grinding mills is provided with an individual bag type dust collector which draws sufficient air through the mill to eliminate any dust nuisance in the mill room and also to assist in keeping the mill discharge temperature down. The dust collected in the collectors is returned to the mill stream so as to be blended in the mill with the cement being ground. Three of the dust collectors were furnished by the Rees Blow Pipe Co. One dust collector was furnished by Northern Blower Co.

Gypsum

Gypsum used at Permanente is a by-product from the West Vaco Corporation at Newark, Calif., which is about 30 miles from Permanente. In the manufacture of magnesia from sea water, gypsum is precipitated out of solution when the magnesium sulphates are changed to magnesium chlorides. The calcium sulphate thus formed is a flocculated gypsum, very high in purity and extremely fine.

It is delivered to Permanente in railroad box cars. The cars are unloaded by a scraper into a screw conveyor which conveys the gypsum to a Fuller-Kinyon pump in a tunnel under the cement silos. From here it is pumped either directly to the mill feed bins or into one of the silos for storage. Gypsum withdrawn from the silos is pumped, using the same tunnel pump, to the mill feed bins.

Two batteries of flotation cells where limestone is floated and chert becomes rejects. After passing through six primary treatment cells, the rejects pass to two additional scavenger cells working in series

Cement Storage

The cement storage consists of three rows of nine silos each, each silo 30 ft. in diameter by 90 ft. deep. Each of the interstice bins is also used for storage of cement. One silo and one interstice bin are used for storing gypsum, leaving 26 silos and 15 interstice bins for cement, which have a combined capacity of 500,000 bbl. of cement.

The cement storage is filled by Fuller-Kinyon pumps, and the piping is so arranged that cement from any or all of the three pumps in the mill room can be deposited into any of the cement storage bins. On top of the silos are three stations, completely enclosed. In these stations, by means of flexible hoses, with quick connecting flanges, cement from any of the delivering pipe lines can be diverted to the nearby storage bins. The three stations serve all the bins and include gypsum as well as the return line which brings cement from the tunnel to be deposited in another bin other than that from which it came.

Under each of the three rows of silos is a concrete tunnel in which is an 8 in. portable Fuller-Kinyon pump. From these pumps in the tunnel cement may be delivered to the pack house, to a field bin made of steel, from which bulk cement may be loaded into trucks or railroad cars, or to any of the main stock-house bins. Thus, cement from a partially filled bin may be transferred to another bin and thereby release one more bin for cleaning and refilling. All the cement pumps are served by Fuller rotary compressors.

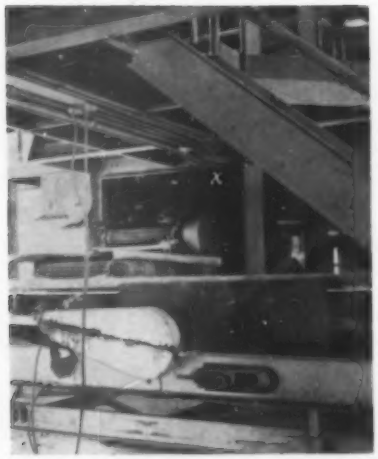
Each of the outside bins is equipped with a side outlet spout in which is a Fuller rotary valve, for loading cement into cars or into trucks. A flexible extension chute, with a quick connecting flange, when connected to the side outlet spout, leads the cement into the car and places it in the two ends of the car. Bulk car loadings are made in a time not to exceed 15 minutes and four cars can be loaded from each side of the silos with but one spotting of the cars.

Pack House

The pack house is equipped with two No. 113-F.C., 4-tube Bates packers. The building has been so made that two additional packers may be installed when needed.

Over each packer are two circular steel bins with steep sided conical bottoms, and each bin has a capacity of 400 bbl. of cement. These two bins come together over the packer and discharge through 14-in. Fuller rotary gate valves into a small common hopper. Directly under the hopper is a No. 4 Fuller rotary feeder, which delivers into a second hopper with a vertical front. In the face of the second hopper is a glass panel over each packer tube so that the operator can see the height of cement in the feed hopper.

The filled bags drop on a 30-in. woven wire conveyor and lie crosswise to the conveyor. The above wire conveyor discharges to another woven wire conveyor and the second wire conveyor delivers the bags to a shuttle belt conveyor which can deliver bagged cement to a truck spotted on either side of the building.



Pack house, showing wire conveyors to remove dust from bags, and the shuttle conveyor which permits delivery of bags to either side of building

Directly under the woven wire conveyors is a steel hopper from which the bag collector draws air, and the air must come into the hopper through the wire conveyors. The first drop on to the conveyor causes the dust on the bottom of the bag to be dropped into the hopper. At the transfer from one wire conveyor to the next, the sack is turned over, thereby cleaning it on both sides.

Each of the two packers has its individual shuttle conveyor, so that both packers can operate at the same time and load into two trucks, if one truck is on one side of the building and another on the opposite side. If and when, the two additional packers are installed, each of the shuttle belts can be loaded from either of two packers arranged to load on it. The four-packer installation is not for the purpose of packing at a faster rate than can be done on the two packers, but there will be four extra bins over them. With eight 400-bbl. bins installed, one over each packer may be used exclusively for commercial cement, and each of the other four bins used for different special cements. In this manner five different kinds of cement can be packed and shipped continuously with no bin cleaning necessary. Only when it is necessary to ship a kind of cement different than the five kinds kept in the bins regularly, will it be necessary to empty and clean the packer bins.

Running parallel with the building, on its center line and below the packers, is a belt conveyor which is for loading railroad cars. By reversing the wire belt at the packer, the sacks are chuted down on car loading belt.

The spill from each packer drops into a bucket elevator which elevates the spilled cement to the bin from which it came. Each packer has its individual dust collector, and the dust gathered in the collector drops into the spill elevator. In this manner there is no contamination of cements even when the same packer loads a truck with two different cements. One man on the packer and two on the truck are sufficient when loading better than 300 bbl. per hour. The bag cleaning, patching and storing department is quite similar to that of other plants.

Lime Plant

The lime burning plant is for the production of lump lime only. The storage pile contains 27,000 tons of clean rock sized from 3 in. to 5 in. This rock is run through a Traylor gyratory crusher and reduced to 1½-in. maximum. The crushed rock is belt conveyed to a screen over square concrete bins near the feed end of the kiln. Limestone, sized from ½-in. to 1½-in., constitutes the kiln feed.

A pan feeder, driven by a motor which has its speed synchronized with the kiln motor speed, feeds the kiln through a feed pipe. The kiln is 8 ft. in diameter by 124 ft. in length and is supported on two sets of cradle rollers. It is brick lined throughout with brick supplied by the Stockton Fire Brick Co. The hot half length is lined with their Diablo Brand and the upper half is lined with their Carnegie Brand. The maximum output capacity of kiln is 100 tons per day.

Gas is used for fuel in the kiln, and the burner was supplied by the Coen Co. When fuel oil must be used, this same burner is used, as it is made so that either fuel may be burned. The draft is produced by an American Blower Co. fan, which draws the kiln gases through a pair of A.B.C. cyclone dust collectors, which remove most of the entrained dust. The collected dust is elevated into one of the bins near the kiln feed bin, from which it is shipped by truck.

An unlined rotary cooler, 5 ft. diameter by 40 ft. long, and not provided with lifters, does the cooling. The kiln draws its combustion air through the cooler, which was supplied by Joshua Hendy Iron Works. An automatic vertical skip hoist raises the cooled lime and chutes it into either of two steel silo storage bins.

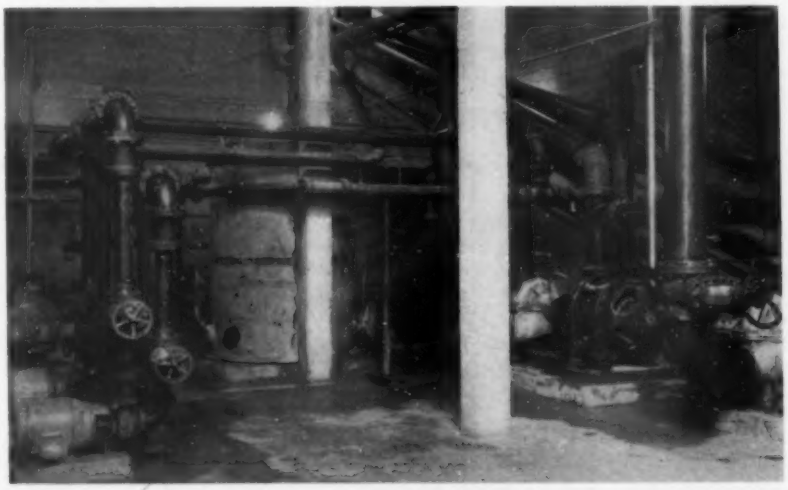
From the sugar rock storage, the stone is delivered by belt conveyor, equipped with a tripper, to a long concrete bin. Along the side of this storage bin are eight draw-off outlets. Leading from each outlet is a 30 in. picking belt conveyor, fed by a Jeffrey vibrating feeder. Each belt is driven by a variable-speed motor, and the belt speed usually is about 50 ft. per min. Over each belt is a fluorescent light and running underneath the battery of picking belts are two belt conveyors; one for selected rock and one for the rejects.

Sugar Rock Picking Plant

As the rock is fed on the picking belt it is violently sprayed with water to clean it thoroughly. One man stands beside the picking belt and removes all except the pure limestone and he delivers about ten tons of selected limestone per hour.

At the end of the cleaned rock conveyor is a sugar rock storage bin, over which is a vibrating screen to remove all pieces under 3 in. in size. From the storage bin, hand-picked and clean limestone is loaded into open cars for shipment to the sugar mills.

Electric power for all purposes is purchased from the Pacific Gas and



Pump pit under thickeners. Two small pumps on the left are for high pressure spray water, the two in the background are for the underflow, and the two on the right are for the overflow

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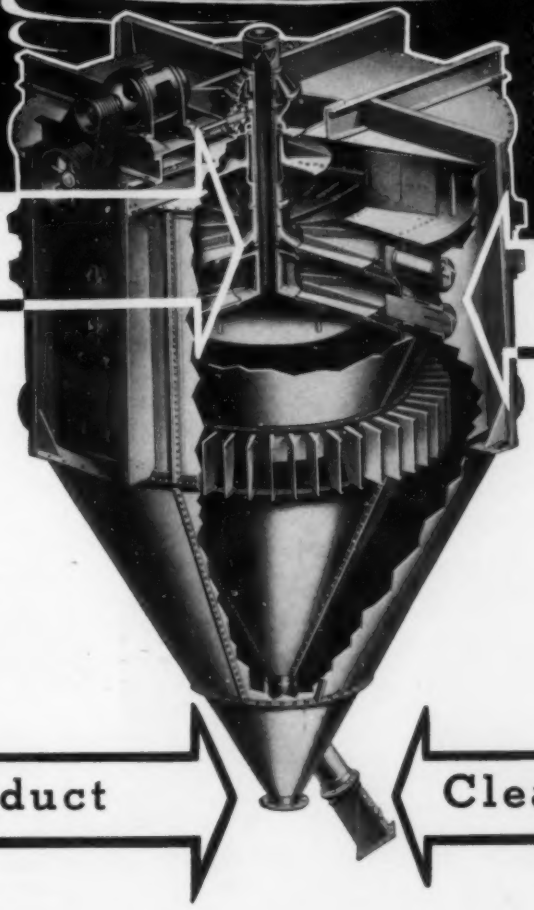

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In one of the largest, recently built and modern-equipped cement plants, where several Raymond Mechanical Air Separators are operating in closed circuit with grinding mills, both standard and high early strength cements are produced. By the simple damper adjustment, any desired specific surface area can be obtained from 1800 to 3300. The flexible fineness control of the double whizzer Separator is equally valuable in classifying high grade hydrated lime to 99.5% through 325 or 400 mesh . . . chalk whiting, 99.9% minus 325 mesh . . . gypsum plaster, 90.43% passing 325-mesh . . . and many other materials. Ask for Catalog 45.

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Electric Co. It is delivered to Permanente through two separate systems, to guard against power failure on either of the systems. The incoming power is 60,000 volts, 3-phase, 60-cycle alternating current. Power meters are on the 60,000-volt side of the transformers and when high tension current is purchased, it has a lower rate schedule than when the power company does the transforming.

There are four transformers, of which but three are used at a time, and the fourth one, a spare, may be put into service in place of any one of the others, in about 20 minutes. The total capacity of three transformers is 10,000 kv.a. and the maximum demand on them is slightly below. These transformers supply both 2300-volt and 440-volt circuits and they feed the main switch and metering panels in the substation. All synchronous motors are for 2300 volts and all other motors are for 440 volts.

In each of the power consuming departments are located control panels from which the motors are controlled. Each motor is started and stopped by push buttons, which are located at convenient places for operating and control. At all locations where several units work in series, such as grinding mills, feeders, elevators, etc., the motors are interlocked, for protection.

Laboratory

The laboratory building, 42 ft. x 77 ft., is a timber frame structure with a cement stucco exterior. The arrangement, made by the Permanente chief chemist, is convenient, roomy and well lighted. All furniture is of special steel design and the building is air conditioned. Over each bench or table, is a Mazda Daylight electric lamp.

The constant temperature room, for volume change and Turbidimeter work, maintains a constant temperature of 75 deg. F. and a relative humidity of 60 percent. The specimen room maintains 100 percent humidity at 70 deg. F. The laboratory is self-contained and equipped to perform any and all physical and chemical testing and control work.

Conclusion

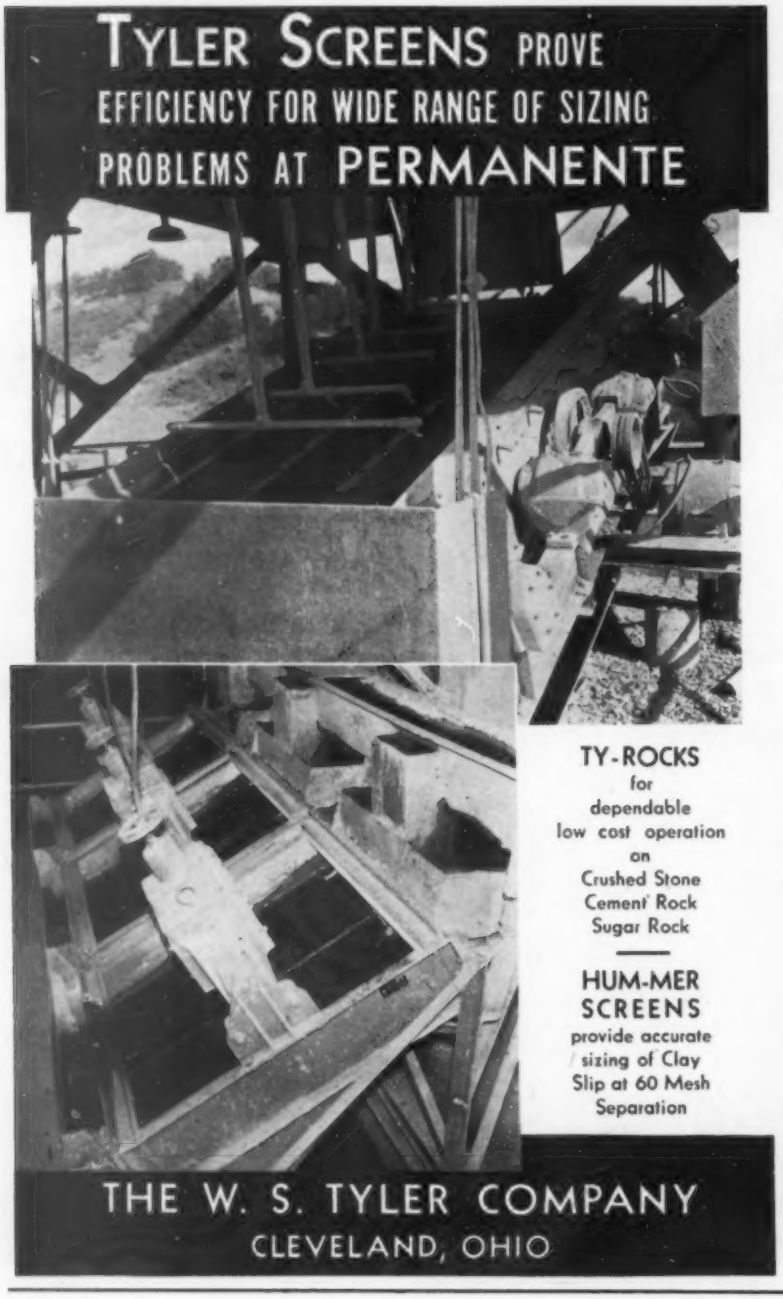
Due to excellent facilities, flexibility of operations, the beneficiation process making it possible to maintain any desired lime content in the ground limestone, and with two distinct types of clay available, any kind or type of portland cement is easily manufactured. A change from manufacturing one type of cement to an entirely different type can be accomplished in 18 hours and two different types of cement clinker can be ground simultaneously.

During the first nine months of operation, six different types of cement have been manufactured, totaling 1,500,000 bbl.

Officers of the company are: Henry J. Kaiser, president; E. H. Heller, vice-president; E. E. Trefethen, vice-president; Henry J. Kaiser, Jr., secretary; Chas. A. Shea, treasurer. The offices are in the Latham Square Building, Oakland, Calif.

H. P. Davis, general superintendent, is in charge of all operations and was also in charge of the construction work. Assisting during construction were: Fred. W. Crocker, chief designer; Fred R. Greyson, mechanical engineer; Joseph Tait, chief electrician. All connected with the Permanente Corporation, have as address P. O. Box 29, San Jose, Calif.

Consulting engineers were Geo. B. Scheer, San Francisco, Calif., electrical work; W. C. Stevenson, San Francisco, cement plant; Prof. Raymond E. Davis, Berkeley, Calif., cement quality; Prof. L. H. Duschak, Berkeley, Calif., dust control. C. M. Price is the chief chemist at Permanente.



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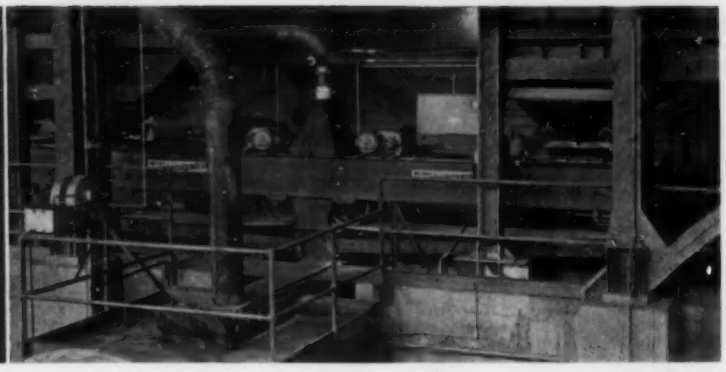

Each of the four clinker grinding mills at Permanente is fed by two MERRICK Feedoweights, one for clinker and one for gypsum. The illustration shows how they are set at right angles to the center line of the mills where they come together and discharge into a short screw conveyor set on the mill center line. These Feedoweights assure the absolute accuracy necessary in proportioning gypsum and clinker for making any type of cement desired.

Two Feedoweights feed the primary raw grinding ball mills and two portable models feed the clinker from storage.

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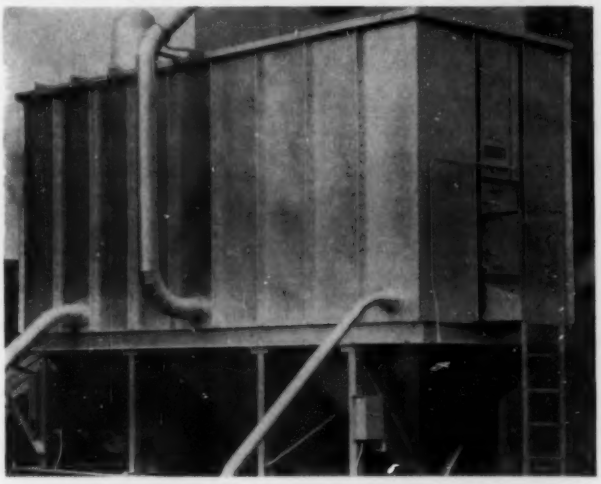

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Industrial Sand and Defense

Directors of National Industrial Sand Association discuss 1941 problems

By BROR NORDBERG

NATIONAL INDUSTRIAL SAND ASSOCIATION, at its semi-annual Board of Directors meeting in Cleveland, Ohio, November 12, had a turnout of about 30 member company representatives. It has always been the Association's policy to invite others representing active member concerns to attend these board meetings, and the attendance was good evidence of the character of the discussions.

National defense and industry problems growing out of it were the principal subjects of discussion along with federal legislation, silicosis, codes being promulgated and some technical information on production and testing. Consideration was given to the possibility of industrial and transportation priorities, and the course which the special advisory committee appointed at the last annual convention should follow in the event the National Defense Program should create emergency conditions.

In 1917-1918 the industrial sand industry was improperly classified, as a construction material, in the same category as sand and gravel, and hence was denied transportation services despite its essential character as a defense material. Prior to this meeting, L. M. Hansen, president of the National Industrial Sand Association, had discussed the subject of transportation with railroad officials and conferences were held with representatives of the Association of American Railroads. Assurances were given that the character of industrial sands was fully understood, and that the railroads were able to handle normal and emergency transportation requirements without priorities or arbitrary governmental action.

Car Shortages and Priorities

Despite these assurances, it was the opinion of the meeting that the committee be prepared to act quickly on any question which might come up in national defense where the industry is affected. Officials of the Association of American Railroads had expressed a willingness to consult with the Association should any changes come up to alter their original opinion. There may be new governmental policies that might result in transportation priorities and industrial priorities and even dictation as to which customers would be served first. These uncertainties are being anticipated in advance by the Association and its defense advisory committee. Several members said that there was already evidence of car shortages but there was some disagreement as to whether these shortages were due to an emergency or a regular occurrence based on demands for other commodities. Discussion concluded with a motion to coöperate with the American Foundrymen's Association and other customer associations in the drafting of a letter which would point out the essentiality of industrial sands to national defense.

The economic staff of the National Defense Advisory Committee has requested from the Association information regarding the relationship between 1939 production of glass sand, foundry sands and abrasive sands, and capacity for production. From discussion as to how to arrive at the relationship it seemed that 1939 production was far short of plant capacity and that the industry felt it could handle any tonnage likely to be demanded. The industry is to be polled and a figure arrived at on the basis of accumulated tonnages.

Testing Foundry Sands

STANTON WALKER, consulting engineer, reported on the activities of the foundry sand committee and the proposed paper on testing foundry sands to be presented before the next American Foundrymen's Association convention. Mr. Walker reported on sieve analyses of unbonded and bonded sands made in customer's laboratories and in others operated by producers and testing agencies. Results showed a wide variation in regard to the reproducibility of test results on the same sands. The purpose of the study and the report is to provide foundrymen with information, emphasizing that variations in materials and testing technique must be considered in outlining their specifications which are rigid and well-defined but apparently are not based on these considerations. It is felt that some of the specifications as now written are impractical from a sand production standpoint.

Some of the tests under consideration, for this report, are the sieve analyses mentioned and others for clay content, permeability, green and dry strength, moisture content, sintering tests, mold hardness and shear and compressive strengths. As a typical example, permeability tests conducted by nine laboratories on the same sample varied as much as 60 or 70 percent. It was pointed out by one of the members that permeability tests could be consistent if the permeability machine was placed on a solid table, the inference being that tests are not conducted according to standard accepted practices and therefore vary and are meaningless.

Need New Sources of Grinding Pebbles

Several members expressed a desire for an interchange of information on operating practices such as the proper design of drain bins and dryers. The European war has cut off the supply of imported grinding pebbles formerly used in producing silica flour and the discussion resulted in an agreement that member companies advise each other of the location of any acceptable substitutes. Experience with substitute materials is quite varied, as to life and contamination, and much information has yet to be developed. One member is using porcelain material, and another told of a carborundum pebble now under test.

A. WARSAW, who attended the recent convention of the National Safety Council as a representative of the Association, reported that silicosis is losing its prominence as an industrial disease and that it is being used as a fine example of how industrial diseases can be controlled by industry. Not so many years ago, silicosis was responsible for 10 percent of the claims for compensation in Wisconsin and in 1939 had dropped to 0.3 percent, said Mr. Warsaw.

Occupational Disease Legislation

In a discussion of codes now in the formative stage, it was reported that the New York Foundry Code will likely be promulgated in 1941, and that a committee would soon be appointed to draw up a code for the New York

(Continued on page 94)

Three articles which follow give the interesting history, fundamental principles of design, and the operating methods and equipment of the four plants

By **BROR NORDBERG**

Frank W. Renwick, president of the Chicago Gravel Co., at his desk. This is a familiar setting to his many friends

Growth of Chicago Gravel Co. Parallels Industry's Progress

I—HISTORY

CELEBRATION by the National Sand and Gravel Association of its (25th) Silver Anniversary at the coming convention in Cincinnati, Ohio, January 15-17, takes us back to the really early days of the industry. Actually November, 1911, was the date of the first meeting of the "National Association of Sand and Gravel Producers" and F. W. Renwick, president of the Chicago Gravel Co., was then and there elected its first president. After a lapse of five years, in November, 1916, meetings were resumed as an annual event, with Mr. Renwick serving as treasurer, and this is the date used as the birth of the Association.

However, to find the date of the birth of the industry, we must go back about 25 years more; and that's just about the beginning of Frank Renwick's association with it—at the time of the Chicago World's Fair of 1893. Before then it wasn't an industry or even a business—it was a hand-shovel proposition. Now Frank Renwick's career just about spans the whole life of the sand and gravel industry, and his Chicago Gravel Co. is probably the oldest business organization in the industry, so we are going to give our readers in the succeeding pages a comprehensive story of the Chicago Gravel Co., because it is a sample of the history of the industry as a whole; not a typical sample perhaps, because this company has had a continuous and successful business life; but a good deal can be learned from its individual experience that was common to the industry as a whole.

G. E. Singletary, general superintendent of all four plants

George W. Renwick, vice-president of the company

The Chicago Gravel Co. is probably the only member company of the original Association that has operated without interruption or consolidation since that time and has been one of the staunchest supporters and members of the national organization from the beginning.

George W. Renwick, vice-president, is prominent in the affairs of the National Sand and Gravel Association today and is at present a member of its executive committee. He is the son of the founder of the company, a graduate engineer from the University of Illinois, and got his start in the sand and gravel business while still in school, back in 1911, at one of the plants where he worked as assistant to a shovel operator.

Bicycles to Automobiles

Frank W. Renwick was born in Elgin, Ill., in 1867. His schooling was completed at the age of 11 when he went to work on a farm. He ran a country grocery store, later a creamery and milk business in Chicago, had a fling at real estate in the suburbs and spent some time in contracting, which got him interested in the production of gravel for macadam streets and roads. That was in 1893.

The first plant built by Mr. Renwick was at Plainfield, Ill., in 1896 under the ownership of the Calumet Improvement Co., which was capitalized for $4000. This plant was more or less a built-over stone plant and

H. M. Anderson, superintendent of the Elgin plant

had a gyratory crusher but was unequipped for washing. The name, the Chicago Gravel Co., had been chartered in 1888 by several farmers and others in gravel production, but this concern went out of business in 1891. The present company is the result of a merger in 1903, when the Calumet Improvement Co. took over the Rowell Gravel Co. and Hammond Bros. Gravel was so unimportant a commodity then that the sign on the office of the Rowell Gravel Co. advertised "dealers in bicycles and gravel." In those days the public thought that all sand came out of the sand dunes that line the shores of Lake Michigan.

The Rowell Gravel Co. had operated a small gravel plant that was replaced in 1898 when the Plainfield plant was moved to displace it. It was then that the first washed gravel was produced.

There were no specialists in gravel plant design and no engineers who would undertake building a gravel plant along sound technical designs that early in the game. The only comparable operation and the only competition was crushed stone; and the only available plans were for crushed stone plants. These did not fit the conditions for gravel at all so it was a case of cut and try by novices.

Few Markets in Early Days

Chicago builders would not consider gravel aggregate for concrete in those days. The principal markets were for torpedo sand, some roofing gravel in the Spring and Fall, and for a gravel not to exceed 1-in. size used as "ramming gravel" in the construction of cedar block pavements. Consequently, big mountains of gravel ranging in size from ¾ in. to boulders were piled up as waste.

Transportation was another problem because of the attitude of the railroad managements, who felt that a favor was being granted in even quoting a rate for the movement of such a low class commodity. Their attitude changed when they found it profitable.

The Chicago Gravel Co. had to pioneer new production ideas, and eventually it came to furnish gravel for many important structures in the growth of the City of Chicago. Among these was the track elevation of the Chicago Junction Railway from Lake Michigan to the stockyards, which was the first elevated railway structure in Chicago to use gravel aggregate exclusively. This job was also the first for which fine and coarse aggregates were proportioned and mixed at the plant.

The company's executive offices in the Fisher building, Chicago, have never been moved, and its four large producing plants have been in almost continuous operation since they were built. These plants are located at Elgin, Joliet, Plainfield and Oswego, Ill.

Andrew Jorgenson, superintendent at Joliet plant

Each has an average hourly capacity of about 300 tons of washed and graded material. They were all built primarily for the production of railroad ballast and for rail delivery exclusively.

Built in 1906, the Elgin plant was the first of the present plants to be placed in operation. Plainfield was built in 1908; the Joliet plant, or Rockdale, as it is called, followed in 1911; and the plant at Oswego in 1923.

Plant Investment Large

Capital investment put into the plants, including buildings, machinery, equipment and gravel property as of 1940 is approximately $2,000,000. About one-third of the outlay is for gravel property, which has been added to through the years in order to keep the plants going.

This constant drain of cash for property and plants is good evidence that the sand and gravel business

S. C. Cutter, Jr., superintendent at Oswego plant

consumes more capital than is commonly thought, and that it takes real money to produce these materials. Owned and controlled by the company are now 3705 acres, which is about three times the original holdings. Complete production figures are unavailable, but for the past 16 years 27,735,000 tons of sand and gravel have been produced.

Operating Personnel

Construction of all the plants was superintended by the late E. W. Renwick, general superintendent (brother of Frank Renwick), under plans and specifications prepared by the J. C. Buckbee Co. Although over 30 millions of tons of sand and gravel have been produced, none of the plants has been moved and all of them still retain the essential principles of design and layout which were considered as the last word in plant design so many years ago. When consideration is given to the way market conditions, specifications, and uses have changed, it is a tribute to the foresight of the engineers and builders of the plants that the design features are relatively the same. Twenty or thirty products are now being produced where three or four were tops in 1910 or 1915.

(Continued on page 65)

Herman Barts, superintendent at Plainfield plant

An Appreciation of Frank W. Renwick

By J. C. BUCKBEE

General view of the Plainfield plant of the Chicago Gravel Co. It was when the author designed this plant that his long-time friendship with Frank Renwick started

THE EDITOR has asked me to write a short story of the great contribution Frank Renwick has made to the sand and gravel industry. I cannot well do this without first telling something of my own background because that was the reason Frank Renwick gave me my first job of designing a sand and gravel plant, and the start of our long friendship.

I was born on the famous Homestake Gold Mine of South Dakota, the son of a millwright. Father later became an erecting man for Fraser and Chalmers, Chicago, and was sent to put up a large mill at Eureka, Utah, for the Eureka Hill Mining Co. He was retained as superintendent. So I grew up in Eureka, attending the common schools and the High School in Salt Lake City, and the University of Utah for a short period. Each summer, after I became old enough, I worked in the mines, mills and shops of Eureka.

In the Spring of 1900 Fraser and Chalmers offered me a position in their designing room and this was shortly followed by my being taken into the engineering sales department. In 1901 the Allis-Chalmers Co. was formed by the consolidation of E. P. Allis Co., Milwaukee; Fraser and Chalmers, and the Gates Iron Works, Chicago, and I carried on with that firm until the end of 1906, traveling pretty well over the civilized world, designing mining plants, special machinery, etc.

In January of 1907 I formed the J. C. Buckbee Co., Chicago, with the idea of designing mining plants, cement plants and crushed rock plants. The gravel business at that time was not recognized as an industry. During my years with Allis-Chalmers Co. I met David B. Piersen, now chairman of the board of the Stephens-Adamson Manufacturing Co. Mr. Piersen was then secretary of this company and ran the Chicago sales office.

About 1905, as I recall, Burton C. Attwood and Ed. Davis were building a gravel plant at Beloit, Wis., with such aid as the machinery men could give. As an indication of how little was known of sand and gravel plant operations in those days, the boys became stalled on how to separate the sand out of the wash water. Mr. Pierson asked me to advise them as I had had considerable experience in separating finely crushed ore out of wash water in the mining industry.

In the Fall of 1907 Mr. Piersen introduced me to Frank Renwick (then vice-president of the Chicago Gravel Co.) as a young man who knew something about the washing and grading of rocky materials and the designing of plants. Mr. Renwick told me that they were going to build a plant of 30 car per day capacity at Plainfield; and after some discussion agreed to give me the job designing the plant for a very modest fee, explaining that they had never employed an engineer but would take a chance and see how it worked out.

At that time I also met Ed Renwick, Frank's brother, who has now passed on. He was general manager of the Chicago Gravel Co. Ed Renwick was the fastest steam shovel operator the Chicago district ever had and one of the most capable operating managers the writer has ever known. He was a tall man of few words, and a leaning toward race track vernacular, and I well remember that as the design of the Plainfield plant, and later other plants we built for the Chicago Gravel Co. progressed, Ed would come into the office, discuss the new ideas we would suggest, and almost uniformly gave his decision by saying, "On form, Buck, it looks all right. Let's go."

The late James Hart, former owner of the Chicago Cubs, was president of the Chicago Gravel Co in 1907 and one of the finest gentlemen as well as executive I have ever met. He took no active part in the mechanics or operation of the plants but was always greatly interested, most sympathetic, and backed us boys in the operating end to the last word.

The Chicago Gravel Co., as I recall, was founded in 1895 and had constructed several plants, the first one being all on a flat car. In 1907 it had a plant at Millsdale on the Alton Railroad near Joliet, and another near Elgin on the Milwaukee road. They had been in the gravel business long enough to learn something of how seriously wooden bins deteriorate and this was the first problem in the design of the Plainfield plant. The writer suggested open-bottom round steel tanks with side loading chutes as being the lowest in first cost for durable construction. This suggestion met with the approval of Frank Renwick, and Ed Renwick and I believed this was the first use of open bottom steel tanks as bins for a gravel plant.

When the Plainfield plant was completed I recall that when I told Frank Renwick one day that we were going to start up the following day and asked him to go out to Plainfield to see the plant run, he told me that I had "better go out alone," that it would "probably be several weeks or several months before we got all the 'kinks' out." I told him we had the plant turning over nicely and that if it did not do well under load the following day, he would not want to see me again. In consideration of my feelings he agreed to go. The plant did very well from the start and this, of course, led to the long, happy association the writer has had with Frank

(Continued on page 88)

Standardize Design to Promote Efficiency

Four automatic tilting boxes for sand classification at Joliet plant. Overflow of first two is feed for the second group of two

ARTICLE II

Fundamental principles of design are the same in all four plants. Equipment also has been standardized to permit interchangeability of parts

ALL FOUR PLANTS of the Chicago Gravel Co. were designed for the production of washed material and, incidentally, were located where more than adequate water supply was available. Today, as we know, a sand and gravel plant site without a good source of water isn't worth much.

Each plant was laid out for rail shipment exclusively and for receiving bank run material from the pit in ore cars hauled by steam locomotive over standard gauge track; and they still operate with that type of haulage. At each plant, material is dumped into a reinforced concrete hopper which feeds out to a primary belt. In all but Rockdale, these belts transport all the material to the head of the screening plant. Rockdale, with a deposit very high in boulders, has a primary gyratory crusher to break them down, and a separate scalping and secondary crushing unit which limits the maximum size of gravel to be delivered to the screening plant.

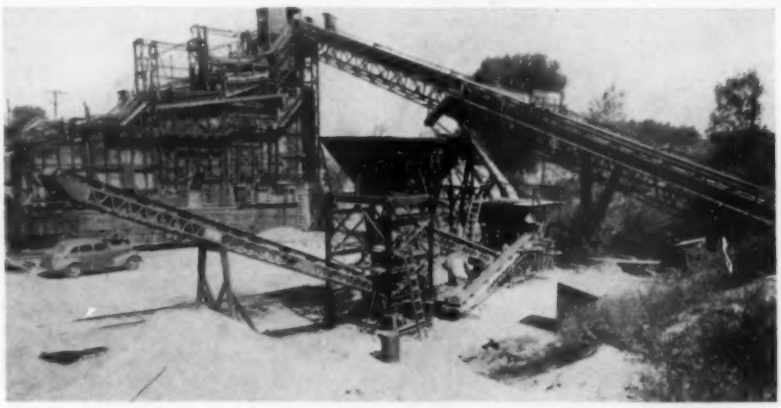
All four plants have sizing screens and sand classification equipment superimposed over the bins. The bins are circular steel bottomless tanks 19 or 20 ft. in diameter and of descending heights from the top screens, so that the flow is by gravity over successive tiers of screens. Sized material drops or is chuted into the bins, and oversize gravel goes to a surge bin over the crushers through wood chutes and after crushing is re-elevated to the head of the plant. That's the way they were built and the way they all operate today except for minor variation.

Standardized Practice At All Plants

After several years' experience with steam shovels, steam draglines were adopted as standard and a conventional excavating practice set up for all plants. All four deposits have general characteristics that lend themselves to dragline operation both for excavation above and below water, and to do the stripping.

At first, steam shovels were the mode of excavation and machines of various sizes were used; one for stripping and one for excavation. At Rockdale, a 3½-cu. yd. shovel with a 65-ft. boom was used, this length being necessary to guard against burying the machine since the bank had a tendency to hang up and cave without warning. Plainfield has a rather shallow bed of sand and gravel which prior to 1916 was excavated by 2½-cu. yd. dragline with a 60-ft. boom. In order to recover underwater material, this unit was replaced by a machine with a 100-ft. boom and 4-cu. yd. bucket. This type of dragline, a Page steam-driven, full-revolving machine on a 24-ft. circle and mounted on 4-wheel trucks, soon became standard.

These machines have a range 200 ft. in width but are working a cut 125 ft. wide in all the pits to permit casting the overburden on both sides of the haulage track. Stripping is done ahead of excavation by the same machine while waiting for the return trip of the train from the plant, a mile or more distant in each case, thereby replacing two shovels. Two machines operate at each plant except at Oswego, which has one.



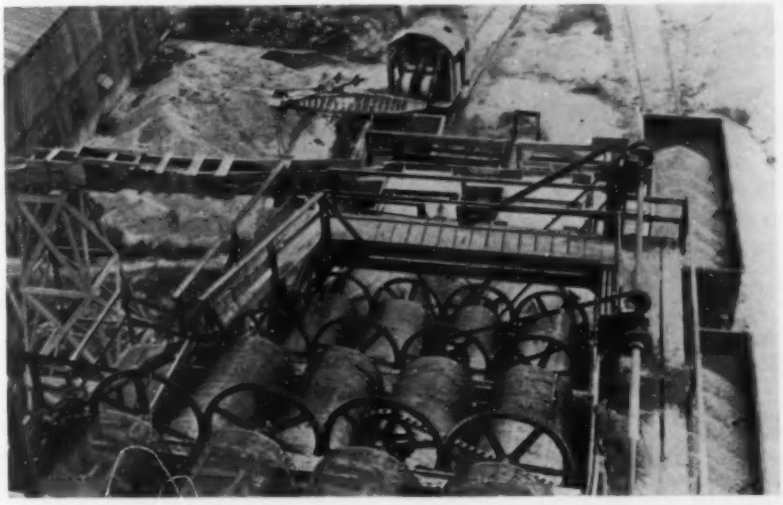
General view of Elgin plant with primary belt to right from hopper. Second belt and chute goes to road mix portable plant

Having decided on the type of machine, standardization in all plants was desired, since by having interchangeable parts shutdowns could often be avoided. In the last 20 years there have been many times when it has been necessary to exchange parts as it would have been costly to wait any length of time for factory parts.

For the same reason, the company has standardized as much as possible on other major equipment still in use; such as cars, locomotives and stockpiling cranes. All pit units are Sommers ore cars, each of which holds 40 tons. Four make up a train that is hauled by steam locomotive to the plant.

All the plants have rail connections, and the company's locomotives play an important part in switching, and handling cars to the bins, stockpiles and railroad sidings. Each plant has four locomotives—American, Baldwin, and Davenport—which are 40- and 50-ton machines. Browning steam locomotive cranes (5 in all) do the stockpiling, re-loading into cars and bins and other miscellaneous work. They have a 1-cu. yd. bucket and eight wheels on standard gauge track.

Barge loading and washing facilities, Joliet, Ill. Storage and reclaiming conveyor to the right, Weightometer on reclaiming conveyor, and head of shuttle conveyor for barge loading on the extreme left



Battery of revolving screens with sand tanks in background at Oswego plant

Prefer Many Small Screens To Few Large Units

Another theory of the original plant designers was to screen materials through a lot of small screens in preference to fewer large screens in order to get better screening efficiency. In fact the Rockdale plant had 2200 sq. ft. of screening surface when it was built. This theory of design is logical from the standpoint of getting more material to the screen holes and less carryover, which means closer sizing, yet almost 30 years later many plant operators do not recognize it.

Having such a screen layout has worked out very well and has been particularly beneficial in helping adapt all the plants to new specifications and new markets. Two of the plants (Oswego and Rockdale) have about the same capacity as when they were built while capacities of the other two have been doubled. The increase in capacity in these two plants and adaptation of all plants to specification change and the addition of different grades of material have been reflected principally in additional crushers in all plants and more screening surface in those now having a larger production.

Ballast is still the principal product but the market has gone toward smaller material with a top size of 1 in. as compared to the big stuff around 1½ in. of 20 years ago. This has meant more crushing units to maintain capacity and, with changes and new specifications for commercial gravel, the use of more screening surfaces. Yet the plants have not changed in operating principle.

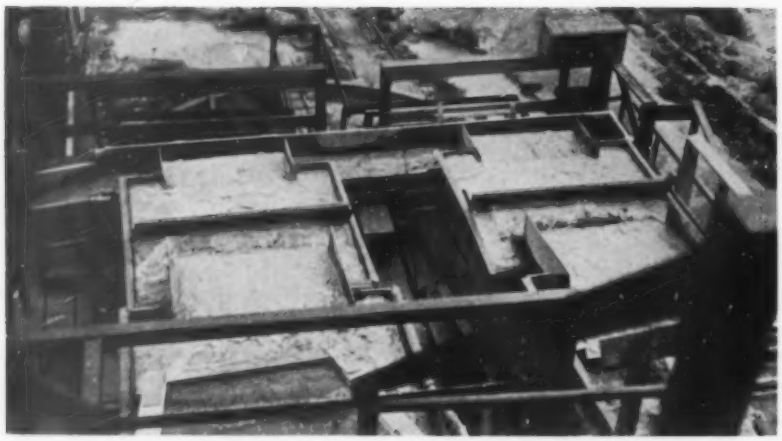
Surge bins over the reduction crushers can handle from two to five crushers as needed, and the use of large batteries of small sizing screens has provided the needed flexibility to produce more products at the same time. The use of many small screens has given an accuracy of split so that many of the "newer" grades can be made by blending, and facilities have been installed for mixing two or more products where necessary.

In the early days all structural work including the superstructures were of timber construction. Practically everything has been replaced by steel. One of the important reasons why screening and classifying changes could be made while retaining the early principles of design was that the extensive removal of wooden superstructures in favor of steel gave more headroom and spaciousness all around. Experience showed the desirability of eliminating vibration as much as possible, and steel columns and supports were therefore built into all the plants to support heavy moving machinery. Elgin, the oldest plant, still has wooden bins, but steel work around the bins supports the equipment overhead.

Recovering Fines

Torpedo (concrete) sand always has been produced in the four plants, but in the early days fines were not wanted and a coarse material was made that did not require large sand settling and classifying equipment. It was just a case of setting a top size in the last battery of screens and fluming the fines and water into wood settling boxes of limited area, and the overflow carried with it all the fines which we know today to be premium material. Requirements for cleaner materials became progressively tougher and increasing quantities of water are handled in the plants.

All the plants now have four tilting, balanced off-center steel tanks operated in banks of two. They are automatic in operation, adjustable by



Closeup of automatic sand tanks at Oswego plant

weights and baffles, and the overflow from the first two is the feed for the others. Two banks of tanks give plenty of settling area and recover fines in the last two that the first cannot handle with the large volumes of water. There are variations in operation of the tanks at the different plants, since several sand products are now made at some of them. These will be discussed in descriptions of the individual plants.

Use Belt Conveyors Extensively

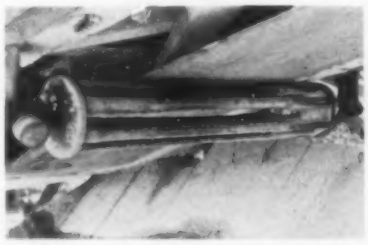
The Chicago Gravel Co. is a large user of belt conveyors and has that type of intra-plant transportation exclusively, even using a criss-cross of two belt conveyors as an elevator in preference to a straight lift to the head of the plant. Early experience with other forms of elevating equipment worked out unfavorably. The principal conveyors are standardized so that conveyor idlers and rubber belting are interchangeable between plants except at Plainfield where the primary belt is narrower and balata belting is preferred in handling wet material. All the belt conveyors, built by the Stephens-Adamson Manufacturing Co., have been, for years, equipped with ball-bearing idlers.

When all these plants were built, market requirements were far different from now. Everything was shipped by rail in cars loaded direct from bins. Soon it became desirable to stockpile materials, and the tendency is toward increasing inventories carried in stock. Conditions then were more stable and, with concrete roads and other concrete construction still in their infancy, there wasn't the demand for materials in the winter months.

All that has changed, along with varying demands for kinds or sizes of materials and quantities of material, and the coming of heated mixing water and calcium chloride and other new ideas in construction have created a demand for materials in the winter.

Need for stockpiling was felt and before 1920 the company had installed belt conveyors for stockpiling direct from bins.

As a single stocking belt gave insufficient capacity, a shuttle belt system was built which permitted stor-



Revolving belt rapper device to remove sand sticking to belt

ing up to 50,000 tons of washed gravel. It consists of an inclined conveyor belt, 105-ft. centers, that transfers either of two principal sizes of gravel, or a blend, to a second horizontal conveyor having 100-ft. centers. This conveyor moves back and forth on a steel gallery 200 ft. in length running parallel to the plant bins and discharges gravel over either end.

This system is in use today in all the plants except Elgin, where conditions are unfavorable for its use, and stocking is done exclusively by railroad cars and locomotive crane. Nevertheless this plant, as well as the others, carries upwards of 1000 cars of material in stock and has some ten miles of standard gauge trackage on the property.

Shipping

All four plants were built long before motor truck haulage was perfected and therefore, being primarily ballast operations, did not lend themselves to truck delivery. There was some reluctance to recognize a trend in that direction and nothing was done about it until a demand developed along about 1927 that unheeded meant a loss of considerable commercial gravel business. In the Elgin territory in particular portable pit competition and trucking became major considerations, and a sizeable part of the company's business is now shipped by trucks. In 1939 some 140,000 tons were handled in that way.

All plants now have truck-loading bins, 55-cu. yd. Johnson weigh-batching outfits and others, of the type that can be knocked down in an hour's time for transfer to a new location. Elgin has nine of these and some 18 railroad cars for use in stockpiling. The Rockdale plant, located on the Lakes-to-Gulf waterway, has been shipping material into Chicago and other centers by barge since 1935 in order to meet competition by water. In 1939, movement by water equalled the tonnage shipped by rail and truck out of this plant, although rail continues to be of most importance.

Special Operating Features

All plants have portable welding equipment and repair shops for general repair and maintenance, but all major work is done in the principal shop at Rockdale.

Washing practice is standardized in all the plants, using American Well Works centrifugal pumps. Large diameter pipe (up to 14 in.) are used for the primary wash-water lines up to the screening plant to keep down the frictional head and the line tapers down to smaller diameters as needed at the screens and classifiers to build up steady pressure. All the water lines are fitted with hand valves to control and shut off the water at any point.

Certain other practices have become standard in all four plants. Spring steel wire cloth is used on all

Two 4-ft. cone crushers for reduction at Joliet plant

Overall view of the Joliet plant from the receiving hopper. Structure on right is the secondary crushing battery, and to the left is the main plant with stockpile conveyor to one side

screens, with perforated plate preferred for large material. For drainage, all sand bins are fitted generously with filter columns covered with ordinary window screen to their entire depth. Another practice is to use belt "rappers" near the head pulley of all belt conveyors carrying wet material, to knock off and concentrate drippings and material carrying over rather than to permit this spillage to accumulate around the plant.

Growth of Company

(Continued from page 60)

All the present operating personnel had the privilege of working under E. W. Renwick and have had years of experience at the several plants, which is reflected by the efficient way in which they are run. In fact all the superintendents have spent most of their working lives with the company, and for that matter many of the workmen have had 20 or more years with the company.

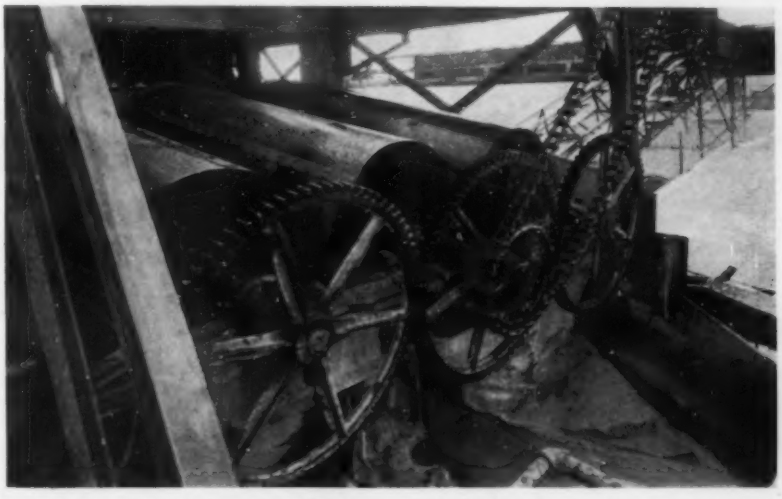
G. E. Singletary, who succeeded E. W. Renwick as general superintendent, has been with the company since 1914. He had been superintendent at Plainfield for four years and assistant to Mr. Renwick until he died. H. M. Anderson, superintendent at Elgin, who started with the company in 1913, has been in charge of operations there for 15 years. Andrew Jorgenson, Rockdale superintendent, has 26 years of service and Herman Barts, at Plainfield, succeeded Mr. Singletary as superintendent 20 years ago. S. C. Cutter, Jr., at Oswego, came to the company 15 years ago upon graduation from Beloit College and has been in charge since 1927.

The Chicago Gravel Co. has the distinction of being the first producer of sand and gravel in the Midwest to install certain types of equipment and to try out new machinery. Credit must be given to the company for information and data that was later incorporated in the designs of this type of machinery by its manufacturers. The first washing plant to operate in the Midwest was operated in 1898 when the original Plainfield plant displaced the Rowell plant.

A No. 5 Gates gyratory crusher, installed in 1896, was the first gyratory type to be operated continuously in a gravel plant. Two or three small crushers had been tried first but gravel was just "too hard" for them.

In 1897 the first steam shovel to operate in a gravel plant was purchased second-hand. This machine weighed 45 tons and cost $2000. Officials of the company were criticized for their extravagance just as they were in buying the first crusher. This appears ridiculous now, but in those days 90 percent of the sand and gravel companies were capitalized for less than $5000. This investment of $2000 was just a starter, since before many years a 175-ton machine costing $65,000 was purchased, and practically all plants in the Midwest were later converted to use power excavating machinery and crushers.

Other operating practices introduced by the company were the use of the first steam locomotive in a gravel pit and the first grizzley feeder ahead of a primary crusher. After most of this experimental and pioneering work there followed the period (about 1915) in which more producers came into the business and with them the advent of specialists in design and technology who were so sadly lacking before.



One of the old type drives still in use on the revolving screens. Alternate screens revolve in opposite direction to reduce vibration

Keeping All Four Plants

Primary belt and water pipe line to screening plant, Oswego, Ill.

THE ROCKDALE PLANT of the Chicago Gravel Co. differs from the others because of an unusual gravel deposit. The presence of many large boulders has made it virtually a crushing plant. It wasn't that way at the very beginning, but shortly after the plant was built as much money was spent to convert it to a "boulder" crushing plant as the original investment. About 75 percent of the material is coarse gravel, including cobbles and boulders, and the remainder a coarse sand, which occurs in a bank or bluff several miles long and extending 56 ft. in depth over the surrounding valley. This material, in a saucer-shaped basin on a floor of limestone, has always been worked around its boundaries in preference to under water excavation. In places the gravel is cemented into a nearly perpendicular face, approaching a conglomerate, but most of it is recoverable by dragline.

As the bank was worked, more and more boulders became evident and those retained on a horizontal bar screen with 6-in. openings over the receiving hopper had to be sledged by hand or thrown out. In addition to the waste, there were operating difficulties in handling large gravel on a belt conveyor, 180 ft. centers, on an 18-deg. incline to a crusher house. Gravel over 4-in. size was chuted to a No. 4 gyratory crusher and returned to the recovery hopper, minus 4-in. eventually being elevated by belt conveyors to the screening plant.

Large Gyratory Crusher and Grizzley Feeder

In a re-design to handle the big material, a Traylor No. 9 gyratory crusher was put in under the receiving hopper to handle large gravel (up to 18 in.). A cable-operated bin gate was the only means of regulating the feed. Symons disc crushers were used for reduction. Feeding large boulders and cobblestones was the bottle-neck in the plant then, and in 1920 it became the first gravel plant in the world to have a grizzley feeder over the primary crusher. The size of the hopper gate through which material fed out to the crusher was enlarged and a Traylor inclined grizzley was installed just ahead of the crusher. This device, known today as the Sheridan feeder, is 4- x 10-ft. and has a 6-in. slope, with movable bars alternating between stationary bars to keep material flowing into the crusher. Minus 5-in. material by-passes the crusher to join the crushed material on a 36-in. belt conveyor to the screening plant. Efficiency, as measured by the power factor, went up 50 percent, and capacity of the plant almost doubled by getting a continuous, uni-

All bins feed to blending conveyor for mixing aggregates, Joliet, Ill. Cars are loaded direct from tipple on left

form feed into the crusher. A cable-controlled gate was the means of getting stone to the feeder.

This part of the plant remains the same today with the original equipment except that manganese steel grate bars are now in use on the feeder.

With a trend toward finer sizes and more commercial material came the need for more crushing capacity and the installation of gyratory crushers for reduction, leading up to the three stages of reduction now in use. This is the only plant of the four which has a crusher at the receiving hopper.

Practice now is for the primary belt to discharge over an inclined plate perforated with 4-in. square openings and for oversize to drop into a surge bin having gate-controlled outlets into four No. 6 Gates type D crushers which have seen about 20 years of service. All these crushers are set to produce the same size of product, and their discharges along with by-passed material are conveyed to the head of the screening plant.

Originally, all the screens were of the revolving type, 42-in. by 10-ft., of a design developed by E. W. Renwick. Some are still in service at this and the other plants. They were made in half cylindrical sections and bolted to two cast iron spiders mounted on through shafts. Each screen carried a 48-in. pitch diameter gear meshing with that of the screens on either side, one screen of each bank being driven through a chain and sprocket from a lay-shaft, which is chain-driven from the head shaft of the main conveyor. This arrangement was designed to eliminate vibration or shock by alternating the directions of rotation. Rockdale had an arrangement of five banks of four screens each.

Two 4- x 12-ft., double-deck Symons vibrating screens now replace four revolving screens at the head of the plant as scalpers, having 2-in. and 1½-in. square openings, top and bottom decks. Oversize is chuted to a surge bin above two 4-ft. Symons cone crushers. At times the 1½- to 2-in. product is similarly handled, after first putting this size over a 4- x 8-ft. double-deck screen just over the bins to scalp out the fines.

Minus 1½-in. material is then divided over two 4- x 16-ft. double-deck Symons sizing screens which have ¼-in. square openings on the lower decks. All the fines and water enter the top bank of two automatic, off-center tilting sand boxes which settle out coarse sand, and the overflows are the feed for two more tanks which catch the finer stuff.

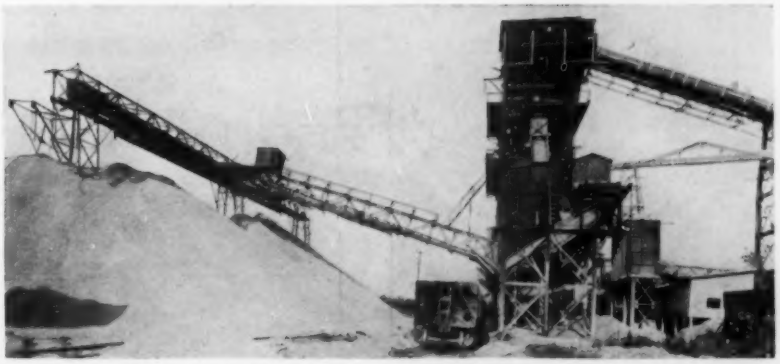
Overflow from these tanks carrying silt, which is the main impurity, is laundered to waste while the sand is split into four 42-in. by 10-ft. revolving screens with 4-mesh square openings. Revolving screens and the addi-

Looking down into gyratory secondary crushers at Oswego plant. The covered chutes are from scalping screens to surge bin over crushers

Modernized

ARTICLE III

Increase crushing capacity, use more vibrating screens, and introduce sand classifiers to recover fines. Long belt conveyors handle all materials at plants



Screening plant with stockpiling conveyor on the left at Joliet plant. To the right of main bins is surge hopper over reduction crushers

tion of fresh wash water are considered preferable to vibrating screens for accurate screening of fine material, based on this company's experience.

Oversize from these revolving screens is a pea gravel (3/16 to ¼-in. plus carryovers) which is sold for miscellaneous uses, while the undersize is classified and dewatered. This system gets rid of the excess water (from the sand tanks) and provides a double-washing for the sand as well as a controlled amount of water (by hand valve) for sand classification.

General view of Oswego plant showing how screened material flows by gravity from the top of one bin to another, and the shuttle conveyor for stockpiling

All the throughs from the revolving screens enter a launder which has an adjustable gate to split the flow into either a rake classifier or an automatic discharge conical settling tank. These two devices do the same work, which is the production of concrete sand. Concrete sand is the only sand made since the deposit is limited in fines which cannot be diverted for other sands. Therefore large settling areas are required to catch the necessary fines.

Bin storage is about 35 carloads in steel tanks, and finished material is loaded into cars through quadrant gates and by means of steel spouts. Bin openings are so located that material from adjacent bins may be mixed in loading.

Water for washing is pumped a distance of ¾ mile by two 6-in. American Well Works pumps through a single 14-in. diameter Taylor spiral-riveted pipe supported by the inclined conveyor trestle to the head of the plant. These pumps deliver 2000 g.p.m. against a 180-ft. head, using a big diameter to hold down frictional losses.

An important improvement in 1930 was the installation of a blending conveyor belt supported alongside the bins to carry any mix of materials to a loading tipple where the blend is rinsed over a screen as it flows directly into cars.

Storage and Cleaning Plant

The last major change at this plant was the building of a storage and screening plant in August, 1935, for the shipment of sand and gravel in barges on the Lakes-to-Gulf deep waterway. It consists principally of a large storage area for separately stocking five sizes of material over a reclaiming tunnel with a belt conveyor and a screening plant at the dock for washing the material as it is loaded. Stockpiles are filled by trains of ore cars (those used in the pit) which travel over a trestle above the five compartments. A 36-in. Robins belt conveyor, 1150-ft. centers, reclaims the material which is released to the belt through manholes, and a Merrick recording Weightometer records the tonnage carried over the belt. A 6-in. American Well Works pump furnishes the water to wash the gravel as it flows over four 4- x 10-ft. stationary screens.

Barges are loaded by a 42-in. Robins shuttle belt conveyor on 60-ft. centers at the rate of 750 tons per hour. Stephens-Adamson Manufacturing Co. and the Milwaukee Bridge Co., both of which figure prominently in the construction of all the plants, fabricated the steel for this one. This loading plant was described in detail in Rock Products, November, 1935, p. 22.

Elgin Is the Oldest of Four Plants

Elgin is the oldest plant and its location at the Hammond pit is near where the Chicago Gravel Co. got its start with a merger of Hammond Brothers, Calumet Improvement Co. and the Rowell Gravel Co. of the "bicycle and gravel" days. The pit was first opened by the Chicago, Milwaukee and St. Paul railroad in 1893 as a source of ballast and was the first gravel pit operated in the county.

Unwashed, bank-run ballast, the only product at the start, still is a very important outlet for this unit, which was a 100 percent rail plant.

Commercial gravel requirements are not much different from those of 25 years ago as to numbers of products handled except for an occasional blend made direct from bins through chutes into cars. Deposit conditions are the reverse of Oswego and Rockdale. The pit runs 65 percent sand, has 5 ft. of overburden and is underlaid with rock and blue clay 20 ft. down. Big gravel is scarce so there is no need for the large crushing capacity of the other plants.

Portable road gravel plant, Oswego, Ill. Feed hopper and primary crusher may be seen in the background

In 1907, one locomotive and two cars operated in the excavation, getting out bank material, and the plant produced 30 cars in 10 hr., about half of present capacity. Screening capacity is greater now, of course, and crushing capacity is proportionately larger.

Originally, all the screens were Stephens-Adamson Gilbert conical type (6 x 4 ft. 6 in. x 3 ft.), three of which are still in operation as scalpers at the head of the plant. E. W. Renwick's revolving screens, of greater size, have superseded the others but the original Stephens-Adamson chain and sprocket drives are still in service. Two banks, of six 3- x 10-ft. revolving screens each, now do the sizing and two No. 4 McCully reduction crushers have been in service since 1918.

Flow of material through the plant is the same as in the other plants, with plus 2-in. from two Gilbert screens and plus 1½ in. from the third dropping into a surge box over the crushers. Belt conveyors return the crushed gravel to the screens.

Undersize (minus 4-mesh) from the lowest tier of screens is flumed into steel sand tanks identical with those in the other plants. The only difference is in the production of sand. All four tanks produce concrete sand and are needed for that since sand predominates. A plaster sand is made as needed by diverting some of the flow to the concrete sand tanks over a 2- x 4-ft. vibrating screen set over a separate bin.

This screen has 8-mesh cloth to scalp off oversize, and the undersize entering the bin is plaster sand. Oversize (approximately 8- to 4-mesh) spouts into a railroad car and is a by-product sold for miscellaneous purposes. A single 150-hp. motor, driving the crushers and screens through flat belt and line shaft, is connected to the screening plant by a rope drive. Two American Well Works pumps (8-in. and 5-in.), driven by 50-hp. and 40-hp. motors, respectively, handle the wash water through separate lines.

The most notable development reflected in this plant is the extent to which portable plant competition and trucking has come into the picture. The trend to trucking materials for local consumption developed slowly until about 1928, when the demand made it imperative to install truck service equipment. Nine weigh-batch-

Sand bin filter for dewatering which is used in all plants

ers are established at the plant which are served by a locomotive crane and a 1-cu. yd. Northwest gasoline clamshell.

Make Stabilized Mixes

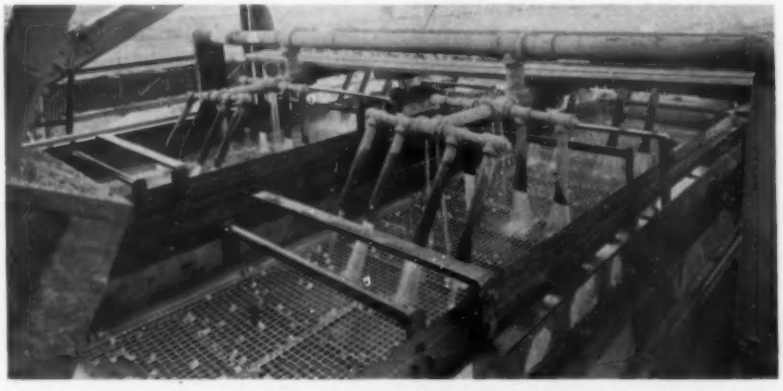
Another development of recent date is the installation of a road gravel plant to produce stabilized mixes. This plant, manufactured by the Lippmann Engineering Works, is set up as an auxiliary to the main plant to receive its feed of material from the same receiving hopper. A second 18-in. belt parallels the 36-in. belt from the hopper and at an intermediate point drops the material into a chute terminating in the portable plant feed hopper. An alternative is to drop the sand and gravel into a weigh-batch bin for loading bank run material into trucks.

Type A road gravel and C6 are the principal products made in the portable. Type A sets a maximum size of 1 in. and requires that 45 to 50 percent be minus the No. 4. Fractured material is preferred, mixed with 5 to 10 percent plastic clay. About 12,000 tons were moved in 1939 for secondary road construction. C6 has the same requirement except for the clay and is used for blacktop surfacing mixed on the job.

A red clay, available in the overburden after removal of black loam, meets the requirement for a binder. It is brought from the pit in carloads for transference by locomotive crane into a hopper over a shredder just above the point where gravel is fed to the plant. The clay hopper has a worm feed into the shredder which drops the clay on to a belt that also conveys the aggregates, thereby mixing them.

A split is made over a 3- x 10-ft. double-deck screen, oversize from the top deck dropping into a 10- x 24-in. jaw crusher and the intermediates into a 16- x 24-in. corrugated rolls. This crushed material recirculates by belt conveyor over the screen again and the screen throughs are stocked off the end of a belt conveyor.

It will be noticed from the illustration that there is a second hopper over the screen so that aggregates also can be fed to the plant from stockpiles by locomotive crane. This plant is driven by a 100-hp. Wiscon-



Two of the vibrating screens showing how vigorously material is washed, Joliet, Ill.

sin gasoline engine and a Case tractor drives the clay shredder, which consists of rolls built to a special design. Electricity is favored for power in all the operations of the Chicago Gravel Co., but the gasoline engine is an advantage in this plant. Road stone can be produced in the early Spring without "kicking in" the big electric power unit at a time when power rates are higher to coincide with peak demands.

Oswego Is Newest Plant

Newest of all the plants is Oswego, which was built in 1922 to the same design as the others, and it uses the Renwick revolving screen exclusively. This plant, built on property leased from the Chicago, Burlington and Quincy railroad, is incorporated under the name of Illinois Sand and Gravel Co. and is operated under agreement by the Chicago Gravel Co. It was designed to be a 100 percent washed ballast plant and is located between Oswego and Yorkville on the Fox River branch of the Burlington.

When the plant was built this deposit consisted of 330 acres of sand and gravel property, running from 20 to 25 ft. deep and covered with 2 to 2½ ft. of topsoil. An analysis of the deposit when the plant was built showed 23 percent to be over 2½ in. size, 28 percent between 1 and 2½ in., 19 percent between ¼ and 1 in., and 30 percent minus ¼ in.

This material contains more cobbles and boulders than were evident from borings and cores taken by an outside agency, whose data were relied on as a basis for design. Had information been more accurate, consideration might have been given to a primary crusher at the receiving hopper. As it is, only a small amount of boulders (over 9 in.) are rejected by a rail bar grizzley over the main hopper, and the primary crushers are located on the ground and fed from a surge bin located in a position similar to that of the secondary crushers at the Rockdale plant, Joliet, Ill.

Screening plant at Oswego, Ill., shown in the center. Chutes to the right lead to crusher surge bin. Locomotive crane is used to spot cars

All of which means that large size gravel must be carried to the head of the plant over the 36-in. belt conveyor and special provisions made on the screens to handle it without too much wear or shock. This is being done more satisfactorily since the advent of abrasion-resisting metals and after experience.

Loading with large dragline into ore cars for transportation to the washing plant, Elgin, Ill.

Three banks of four Renwick screens are retained for sizing, but vibrating screens have displaced those used for scalping. The first stage is to split the primary belt load to two 4- x 8-ft. Stephens-Adamson single-deck scalping screens with 2-in. square openings. Water is applied generously under high pressure on these screens and in the discharge chute from the conveyor head, the oversize dropping through a chute to a surge bin above a battery of four gyratory primary crushers set to crush 1½ in. minus—two No. 5 Gates, a No. 4 Traylor and a No. 5 Traylor. A dewatering plate with ¼-in. perforations in the chute to the surge bin drains off excess water ahead of the crushers.

Here again, belt conveyors are considered preferable to any other way of elevating material. A 24-in. belt carries the crushed gravel back to join the flow of bank run on the primary belt, thereby closing the circuit with the scalpers. Minus 2-in. gravel through the first scalpers is put over two similar screens, and a 1¼- to 2-in. product drops into a 4-ft. Symons cone reduction crusher, returning via belt conveyors. Ballast continues to be 95 percent of the output of the plant (C. B. and Q.), with a top size of 1¼ in.

Vibrating screens have proved advantageous as scalpers at this plant because of their ability to handle the big gravel and discharge it freely off the end. National wire cloth is used except on the top scalpers which have a ½-in. thickness of punched flat plate (tank steel). At the point of discharge on to the screen, an 11- x 24-in. section of ½-in. manganese steel plate is superimposed on the tank steel with its perforations gauged to fit, giving a thickness of 1 in. at the point of greatest shock.

Revolving screens are of perforated steel plate with a descending metal thickness on the finer sizes, such as ⅛-in. with ¾-in. openings and 12-gauge with ¼-in. openings, to lessen blinding of the screens. Each screen has been fitted with internal paddles, or lifters, of perforated steel to cascade the material, thereby increasing the scrubbing action and the effective screening surface. Baffles at the lower

(Continued on page 72)

Two of the four gyratory reduction crushers at Joliet plant

Specialists Discuss Rock Products

American Institute of Mining Engineers' group visits Ottawa silica industries

By NATHAN C. ROCKWOOD
Mem. Am. Inst. of M. E.

DR. M. M. LEIGHTON, chief of the Illinois Geological Survey, modestly kept pretty much in the background, but the simultaneous meetings of the Industrial Minerals Division of the American Institute of Mining Engineers, the Illinois Mineral Industries Committee and many other associations interested in mining and mine products were really as much to honor him as to celebrate the dedication of the new Natural Resources Building on the campus of the State University at Urbana, Ill., November 14, 15 and 16. Dr. Leighton has been outstanding among professional scientists in his practical viewpoint toward the active help state geologists can be to the mineral industries of their states.

There were many sessions of interest and value to rock products producers. Unfortunately they were held simultaneously so it was impossible to attend but a few. For example, while discussions of rock and rock products were being held, there were also papers and discussions on coal, ceramic materials and geology, some of which would have been of much interest to rock products producers.

Economics

W. H. VOSKUIL, mineral economist, Illinois Geological Survey, discussed "The Economic Development of the Industrial Minerals Industries of the Middle West," with particular reference to glass sand and agricultural limestone. Illinois produces from one-fourth to one-third of all the glass sand in the United States; and using annually between 1,500,000 and 2,000,000 tons of agricultural limestone, leads the country in that field. Dr. Voskuil said that the change in the character of road building in recent years had created large demand for road gravel for farm-to-market roads, rather than for concrete aggregates.

PAUL M. TYLER, chief engineer, nonmetal economics division, U. S. Bureau of Mines, discussing "Future Changes to be Expected in the Economics of the Industrial Mineral Industries of the Middle West," said that growth of the chemical industries and the defense program would probably spur the growth of mineral industries.

W. M. WEIGEL, mineral technologist, Missouri Pacific R. R., stressed the desirability of consulting the various railway companies' mineral experts when considering projects along their lines. He pointed out how new uses, new processes and new industries create new markets, of which the railway mineral experts often have advance knowledge.

H. C. M. CASE, professor of agricultural economics, University of Illinois, speaking on "Some Aspects of the Use of Industrial Minerals for the Construction of Farm Improvements," gave some interesting results of a personal farm-to-farm canvas. He found 88 percent of new farm buildings now have concrete foundations; the farmers' reasons for use of concrete being "for durability, less work, rat and termite proof." Outside of the foundations there is still an enormous market for cement and concrete products. Wood shingles appeared to be most popular, in spite of the fact that in most cities they are practically no longer used.

Limestone and Dolomite

DR. H. B. WILLMAN, associate geologist, Illinois Geological Survey, presented a paper on "Resistance of Chicago Area Dolomites to Freezing and Thawing," which, when published in full, should prove of very great interest and value not only to quarry operators in the Chicago area, but dolomite and limestone producers everywhere. It is a very thorough analysis of the relation of the physical and mineralogical character of the stone to freezing and thawing tests. It proved quite conclusively that there is a great variety of types of stone in any quarry, and that these types vary widely in resistance to freezing and thawing tests. Dr. Willman divided the Chicago dolomites into three general types or classifications: (1) close grained rocks, (2) medium grained, and (3) coarse grained. The fine grained, or close grained, rock is the one least resistant to freezing and thawing, and some of the coarse grained rock showed remarkable resistance.

NATHAN C. ROCKWOOD, editor of ROCK PRODUCTS, discussing the significance of the paper, mentioned the objections to the use of dolomite for sewage treatment plants frequently made because of alleged lack of resistance to freezing and thawing, and pointed out that by selective quarrying, dolomite from the Chicago area, could be produced which would fulfill every test. If a producer is producing stone for a very particular use he should not be discouraged by failure of test samples from the run of the quarry; he should find out if there is not some one stratum or part of the quarry where satisfactory stone can be found and a satisfactory product made from it.

ARTHUR BEVAN, state geologist of Virginia, described the stone deposits of that state in some detail; and told what industries were built upon them and where.

Mineral Powders

B. B. MCHAN, technical director, Calcium Carbonate Co., presented a very valuable paper on "Fundamental Properties of Fine Powders." Mr. McHan does the research and control work for a half dozen producers of finely pulverized high calcium limestone, who sell their special product through the Calcium Carbonate Co. The chief job of his laboratory has been to correlate existing scientific knowledge with the physical and physico-chemical properties demanded by various industrial applications.

Fundamental properties of finely ground calcium carbonate studied were: (1) morphological characteristics (those that have to do with their structural origin—the sea-shells they are made of, etc.); (2) particle size distribution; (3) state of aggregation or dispersion (that is whether the particles tend to bunch up or stay apart); (4) capillary and void size (related to the amount of liquid the particles will absorb, or hold on their surfaces); (5) chemical constitution; (6) dipole moment; (7) interfacial energy (these terms refer to properties of crystals, and particles of liquid so small that they often no longer follow the laws of gravity.)

Mr. McHan emphasized the impor-

tance of particle shape, which is often overlooked. (Too often the shape of these fine mineral particles is assumed to be spherical, which they most often are not.) The attempt to classify fine powders by particle shape presents many difficulties. In the conduct of the research and correlation work in the laboratories of the Calcium Carbonate Co. the following rough scheme of morphological classification has been tentatively adopted: (1) The crystalline form and habit as determined by the classical laws of crystallography; (2) the frequency distribution, by microscopic count, of each crystalline type or habit; (3) degree and type of fragmentation; (4) general form and frequency of irregular granules; (5) surface configuration; (6) geometric form.

Mr. McHan showed lantern slides of microphotographs which illustrated examples of this classification. The shape of the particles and the particle size distribution are very important factors in the settling rate of the particles in different liquids, and in their usefulness in putty and as mineral fillers. By selection of the limestone to be pulverized some of these factors can be controlled and uniform products produced. The method of grinding also affects the shape and particle size distribution.

This paper contains a great deal of information for any one desiring to know more about fine mineral powders; and it should furnish the starting point for much original research by others. It isn't enough any longer for a producer to grind up a rock and expect it to fulfill a definite purpose in some industrial process or in some other product where it has a particular function to perform. He must know as much about its various characteristics as can be found out by the most up-to-date knowledge of the physical sciences. Then he can adapt his processing to give the user what he wants.

Air Separator Performance

ROBERT A. KINZIE, JR., acting superintendent, Santa Cruz Portland Cement Co., presented a paper, which was abstracted by the chairman in the absence of the author, on "Calculations for Air Separator Efficiencies." It is a difficult paper to abstract because it consists of formulas, tables and charts, without which the text is practically impossible to understand. *(Continued on following page)*

(1) Group of members of the American Institute of Mining Engineers at the quarry of the Ottawa Silica Co. (2) Quarry face (to the left of the well drill, notice a small bulge in the face; it is a typical blast). (3) Hydraulicking operation. (4) Inspection of carloading equipment. (5) and (6) Dustless screening operation, which created much interest

Mr. Kinzie explained that the work and results outlined in this paper were accomplished to find out for his own information the efficiency of an air separator installation. The separators take the product of four 5 ft. x 22 ft. tube mills; the product of the separators is sent to storage and the oversize is returned to the tube mill feed bins.

A method, based on standard tests and calculations, was worked out that gave the efficiency of the separators. The results of the work indicated that the air separator could be theoretically replaced by a sieve of fairly constant size (within normal operating limits) regardless of the fineness of the feed or product. The size of the screen in this case would have an opening of about 30 microns.

These results have been confirmed on other installations, and show that the construction of the separator has more possibility of improvement than the means now supplied for changing the fineness of the product.

The formula for efficiency that Mr. Kinzie used is that given by H. W. Newton, ROCK PRODUCTS, August 13, 1932: $E = \frac{(a-v)(b-u)}{ab(1-u-v)}$, in which

a = percent oversize in feed.
b = percent undersize in feed.
u = percent undersize in oversize.
v = percent oversize in product.

This is the standard formula given in mining textbooks for classification or screen efficiency. Its development is given in Mr. Newton's article. In this case, Mr. Kinzie sought to find the separator efficiency not at a certain particle size, but the efficiency to produce a cement having a certain specific surface area, so that the v was dropped from the formula, leaving:

$$E = \frac{b-u}{b(1-u)}$$

Specific surface area was determined by the Wagner turbidimeter. To produce a specific surface area of 1880 with cement No. 1, the efficiency calculated was 55.4 percent. Much of the paper is given over to the calculation of surface area of each the various fractions from 7.5 to 74 microns. The paper is, so far as the editor knows, the first attempt made to calculate air separator efficiency for producing cement of given specific surface area, rather than efficiency at some predetermined screen mesh. When published in full by the American Institute of Mining Engineers, it should be studied well by cement manufacturers.

On Saturday, November 16, a group of mining engineers, members of the A.I.M.E., under the leadership of Dr. J. E. Lamar, Illinois Geological Survey, visited the quarry and plant of the Ottawa Silica Co., Ottawa, Ill., where they were guided in their inspection by Geo. A. Thornton, vice-president. The visitors were particularly interested in the hydraulic mining operation and the measures taken in the screening plant to eliminate dust. In the afternoon the plant of the Libby-Owens-Ford Glass Co. was inspected.

Chicago Gravel Co. Operating Practice

(Continued from page 69)

end hold the material back. Probably 85 percent of the gravel produced is crushed, which is considered desirable by the railroad.

When the plant was built, concrete sand was the only fine material made, using wood settling tanks which were manually operated, but the plant now produces a plaster sand and a No. 3, which is a coarse filter sand, or it is blended with about 30 percent ballast gravel (1¼—⅜-in.) in loading cars.

This deposit differs from Rockdale in having enough fines to produce several sands which are made by feeding minus ¼-in. into tilting tanks (4) identical in size and arrangement with those at Rockdale. No. 3 has to be 100 percent through ¼ in. with a minimum of minus 20-mesh, which requires a large volume of water (the plant uses 2000 g.p.m.) and turbulence to float out the fines.

Hydraulic water is introduced inside the two top tanks through four jets at the "sand level" near the bottom. The overflow goes over into the other tanks where either concrete sand or plaster sand is produced—the adjustment being the weights that govern the tilting mechanism and baffles which either can be raised or lowered.

Water is handled in exactly the same way as at Rockdale except that the main line is 12-in. diameter and the pumping head 100 ft. The main water line, which is supported on the main conveyor trestle, is of Armco spiral welded pipe. Dresser couplings on this line provide a sleeve joint for expansion and contraction and are of the type extensively used on commercial gas and water lines. The overflow from the sand tanks is wasted through a 12-in. Naylor lock seam pipe.

Plant capacity is 300 tons per hour and bin storage is 12 cars. Ninety-five percent of the output is shipped by rail, and trucks are serviced by two weigh-batch bins. Not having a large commercial business, this plant carries much less in stock than the others.

Portable pit competition in the production of road gravel material used locally has prompted the installation at Oswego of a portable plant independent of the principal operation as an alternative to losing that business. This plant produces in 8 hr. 200 cu. yd. of state specification No. 15 road gravel, which is a material 100 percent minus 1 in., without any specified amount crushed, and it is mixed with 9 or 10 percent clay.

It is a Pioneer plant equipped with a Universal jaw crusher and a shaking screen, supplemented by a Gates No. 3 gyratory crusher to handle gravel up to 6-in. size. A 1-cu. yd. Brownhoist gasoline dragline on crawlers digs the gravel and clay and dumps it into a small hopper which has a pan feeder and a gravity screen to by-pass fines around the primary. Reduction of oversize from the screen is accomplished through the jaw crusher and the finished product is stockpiled direct from a stocking belt. Two Case tractors are the power units, driving the plant through flat belt off the flywheels.

Two Changes at Plainfield

Plainfield has undergone practically no change since it was rebuilt in 1916 and still uses twelve 42-in. by 8-ft. revolving screens arranged in four banks of three. Crushing equipment has been increased from a disc crusher and a No. 5 Gates crusher to four of the latter arranged in a battery just like in the other plants.

It was built on land formerly owned by the Elgin, Joliet and Eastern railroad for the purpose of producing ballast. It too has the more modern tilting sand tanks (4) and, in addition, a wood settling box which catches fine sands from the tank overflows. Truck delivery is unimportant here since the plant is remote from any metropolitan areas.

Turnpike Tolls Higher Than Anticipated

FOR THE FIRST MONTH of operation, the Pennsylvania Turnpike Commission reported that 264,480 motor vehicles used the super-highway during that period with toll collections totalling $233,829. This is $17,559 more than the anticipated revenue based on the engineers' estimate. With an average of 88c per vehicle toll charge and with the lowest toll for passenger cars for the entire 160 miles at $1.50, it is indicated that a large percentage of the highway users do not go the entire length. The Commission showed some disappointment in the fact that only 14,000 trucks used the highway during the month.

Increasing Fuel Efficiency by Preheating Rotary-Kiln Feed

(Contributed)

FOREWORD

WE HAVE all watched the progress made in heat recovery and utilization at the firing end of the rotary kiln; and we have all been aware of larger losses at the gas exit (raw material feed) end. Knowing that F. L. Smidth & Co. engineers have long been working on this problem we suggested they report progress. The accompanying article is the result.

The Editor

FROM A FUEL STANDPOINT, the rotary kiln was originally far from satisfactory. However, there has been a continuous improvement in this respect, with the result that the fuel efficiency of a modern rotary kiln is now generally at par with, or better than, the efficiency of competing machines. This development has been particularly pronounced during the last fifteen years when a number of heat saving devices have been introduced, by means of which the fuel consumption per ton of finished product has in many cases been practically cut in half.

In the cement industry, a trend from the dry to the wet process made it particularly important to improve the fuel efficiency of the wet-process rotary kiln, and today a modern wet process kiln has a better fuel efficiency than the average dry-process rotary kiln.

This accomplishment has led to a similar engineering development of the rotary kilns employed in the manufacture of lime, refractory dolomite, magnesia, etc., and, during recent years, the rotary kiln has replaced a number of other type of furnaces in the manufacture of these products.

The most important heat losses from the rotary kiln are as follows:

1) Loss of heat in stack gases.
2) Loss of heat in finished product.
3) Radiation loss from kiln shell.
4) Loss of heat due to improper combustion.

A graphical heat balance for an average dry process lime kiln of relatively short length, without any special heat-saving devices is illustrated in Fig. 1-A. It will be noted that the amount of heat carried away with the stack gases amounts to approximately 45 percent of the total amount of heat produced from the fuel in the kiln. whereas the total radiation loss from kiln and cooler amounts to approximately 16 percent.

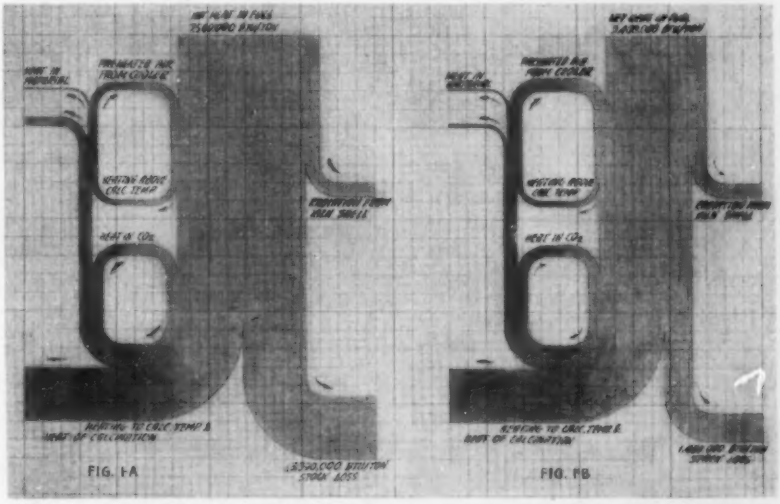
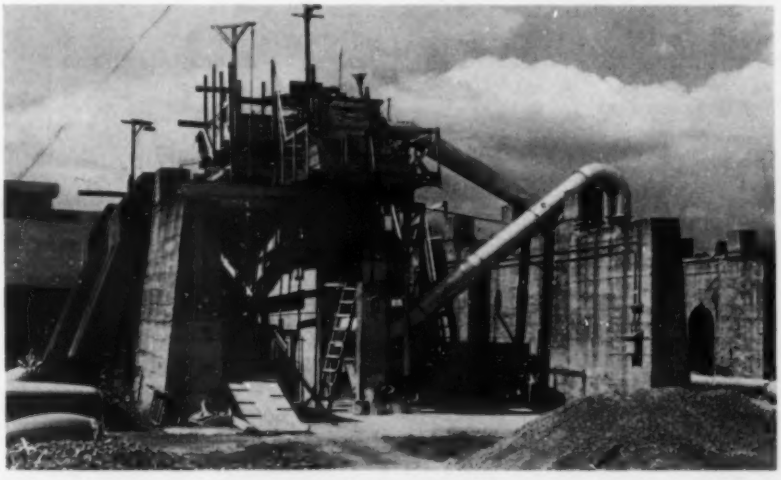


Fig. 1-A. Conditions existing in a dry process kiln of relatively short length without heat-saving devices. Fig. 1-B. In a relatively long kiln with heat-saving devices

The other heat losses referred to are, naturally, also of importance. By utilizing efficient cooling equipment for simultaneous cooling of the material and pre-heating the air for combustion, the efficiency of the kiln is increased. The same applies to reducing the radiation loss by the use of insulation between the refractories and the kiln shell, in such part of the kiln where the insulation will stand up satisfactorily and will not seriously impair the life of the refractory lining. Finally, the problem of obtaining the proper combustion in the kiln, so that combustibles are not wasted together with the stack gases, has been carefully studied, and this has been solved by the proper application of automatic gas analyzing equipment and by improving firing equipment.



Preheater pilot plant used to make tests from which operating data was secured

Heat Balance Charts

The efficiency obtainable by means of a modern rotary lime kiln is illustrated in the graphical heat balance shown in Fig. 1-B. Reference to this heat balance will be made later.

Another early attempt to utilize the

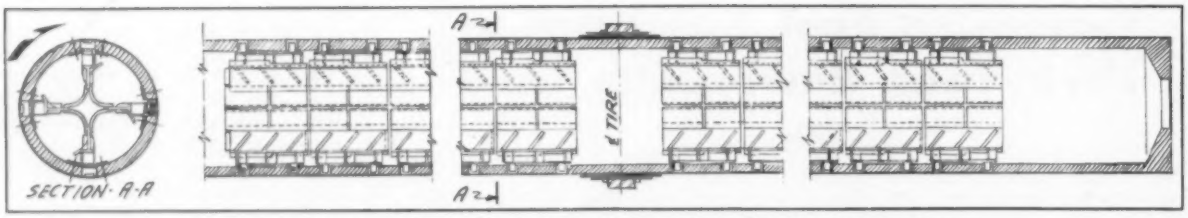


Fig. 2: Sectional and longitudinal views of kiln equipped for lime heat exchangers

waste heat from rotary cement kilns operating on the dry process was the use of the hot kiln gases for drying the raw materials in separate driers, prior to grinding. This generally results in excessive dust loss, because a relatively high velocity of the gases through the drier is necessary if any appreciable amount of moisture is to be driven out.

An important contribution toward increasing the efficiency of wet process kilns was made by F. L. Smidth & Co. approximately 15 years ago, with the introduction of a patented system of dense chain loops suspended in the feed end of the kiln, whereby the drying effect of the kiln gases is utilized to a considerably greater extent, thus resulting in lower stack gas temperature and lower heat loss through the stack. This chain system has found general approval within the cement industry, and more than 130 installations are now in use in the United States and Canada. It is also employed in other wet process kilns, for example in kilns for recovery of lime from sludge, as well as kilns for sintering flotation concentrates and ore fines.

As a further attempt to increase the efficiency of wet process kilns, may be mentioned a new type of slurry preheater, which is mounted inside the kiln, immediately ahead of the chain system, and which results in still more reduction of stack loss. This device (patented) consists of a number of compartments, partly filled with metal bodies of a special shape. In passing through these compartments, the slurry is preheated almost to the boiling point of water, due to the effective contact with the gases coming from the chain system. Several slurry preheaters of this type have been in satisfactory operation for more than a year, and this device will undoubtedly be adopted by a great many cement producers.

From an operating point of view, it is preferable for the wet process operation to employ a relatively long kiln, with internal chain system and slurry preheaters. In this connection, it is of interest that several large cement companies have recently gone in for lengthening existing kilns, in order to obtain better fuel economy. In several cases, this has been accomplished by joining two existing kilns together, thus obtaining a kiln of the same diameter, but of double length.

Pre-Heating Equipment for Dry Raw Materials

During the last few years, F. L. Smidth & Co. has endeavored to apply the experience gained with wet process cement kilns to rotary kilns for the burning of limestone, dolomite and similar materials, so that like benefits, in the way of improved quality and fuel efficiency, might be obtained. Although it is not practical to utilize the chain system direct in the dry process kiln it has proved possible to obtain similar results by installing a heat exchanging system of special design in the feed end of the kiln.

The object is, of course, to expose the greatest possible surface of the material to the effect of the kiln gases, and to provide intimate contact between the gases and the material so as to obtain improved heat transfer. This has been accomplished by installing longitudinal partitions, provided with conveying flights, so arranged that the feed end of the kiln is actually divided up into a number of individual parallel compartments, through which proportionate amounts of material are being conveyed and exposed to the effect of the hot gases.

A typical system of heat exchangers is shown in Fig. 2. The system normally consists of castings fastened to the kiln shell by means of specially designed shoes, which are installed flush with the refractory lining. An important feature of this design is the special spring plates employed to interconnect the castings in such a way that expansion and contraction due to temperature changes are satisfactorily taken care of. In many cases, the system of heat exchangers has a total length of approximately 50 ft. The number of compartments into which the kiln is divided depends on the diameter. For comparatively small kilns, it is generally satisfactory to employ only four compartments, whereas for larger diameter kilns six or eight compartments are used. The lower part of the heat exchanging system consists of heat resistant metal, in order that it may withstand the relatively high temperature of the gases entering the system.

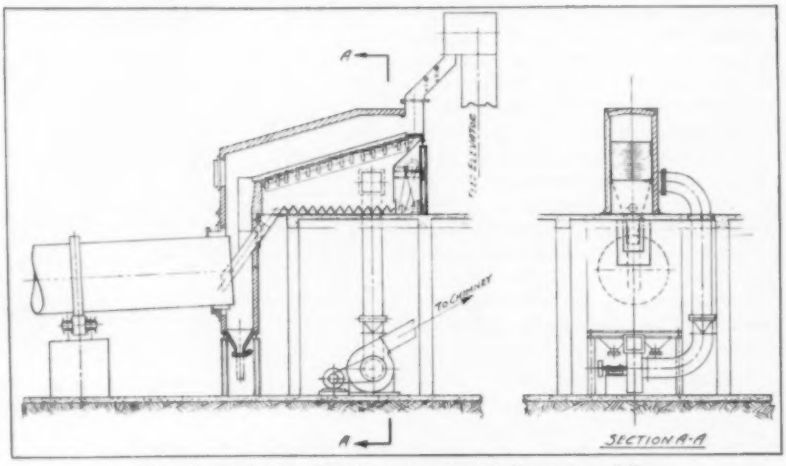


Fig. 3: Typical preheater arrangement for rotary kiln

During normal operation, the compartments are practically half filled with material, so that the free cross section area of the kiln is considerably reduced, with a corresponding increase in velocity of the gases. It is a well-known fact that the amount of heat transferred is a function of the velocity, and this increase in velocity is, to a great extent, responsible for the efficiency of the heat exchanging system. Normally with

(Continued on page 100)

CONCRETE PRODUCTS AND CEMENT PRODUCTS

CONCRETE MASONRY
Reaches Into the Farm Market

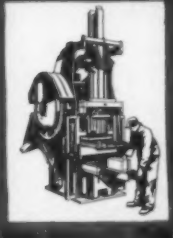
Madison Silo Co., Madison, Wis., supplied all the concrete units for these large dairy farm buildings.

LARGE and SMALL
CONCRETE PRODUCTS PLANTS

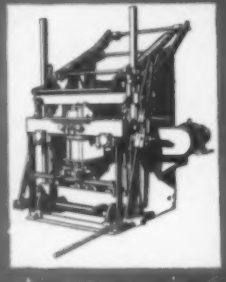
BESSER
Multi-Mold
250
Per 8 Hour Day

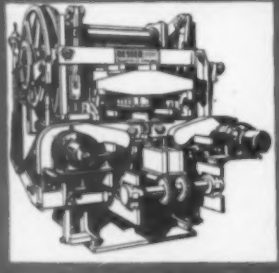
BESSER
Super Vibrapac
4800
Per 8 Hour Day

TAMPERS



VIBRATORS





BESSER
PLAIN PALLET STRIPPERS

provide the greatest economy and efficiency in any concrete products plant—large or small—by making all sizes of units on one set of plain pallets.

BESSER PLAIN PALLET STRIPPERS also make fully pressed top blocks—the kind leading architects and builders prefer.

BESSER MANUFACTURING COMPANY
COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS
Complete Sales and Service on
BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND
212 40TH STREET ALPENA, MICHIGAN

THE SAVING IN PALLET COST WILL PAY FOR ANY BESSER PLAIN PALLET STRIPPER

View of plant and storage yard showing name of company painted in large letters

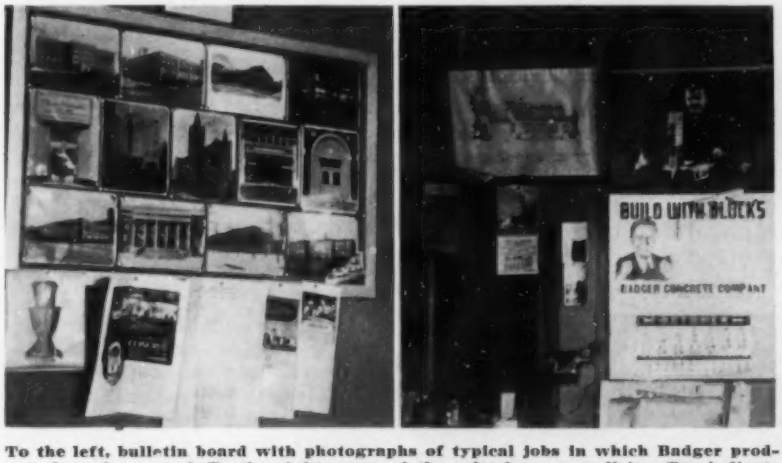
Advertising That Pulls

Consistent program of advertising, use of a variety of novelty good will builders, and a diversified line of concrete products create sales

Edward Olsen, aggressive president of Badger Concrete Co.

MERCHANDISING is by far the most important factor in building up a successful concrete products business. To be sure, it is essential that a high quality concrete unit be manufactured to fit into today's high standards for construction, but it doesn't do much good unless these units are sold. A certain amount of business will come without any special effort, but this is limited, and cannot support financially the larger investment in machinery to make better concrete products which are so necessary in enlarging markets for these units in the higher types of construction. Planned merchandising is often the difference between the growing concern and the one which makes little progress.

As an illustration of merchandising practices that bring results, the Badger Concrete Co., Oshkosh, Wis., is a standout, and much of the credit is due the president, Edward Olsen. In business since 1905, this concern has grown steadily by following a long range policy of stressing high quality in its sales program. In discussing Mr. Olsen's ideas, it is understood that some of them would not apply equally as well to other companies operating under entirely different local conditions, but certain things he does are considered sound merchandising under any conditions.



To the left, bulletin board with photographs of typical jobs in which Badger products have been used. To the right, some of the calendars on wall in office indicate type of material sent to customers and prospects

Product Diversification Increases Markets

Oshkosh is a city of 40,000 population which, in itself, means that some diversification and distribution outside the city are necessary to get a large volume of business. Badger products are sand and gravel concrete and Haydite concrete block, concrete sewer pipe up to 60-in. diameter, cast stone and the Doswell and

Series of newspaper advertisements used by Badger Concrete Co. The copy carries a "punch" which has done a real selling job for this company

Kover air-sealing concrete vault. Certain other products, such as precast lighting standards, are also made.

Concrete block are manufactured on a No. 9 Stearns Joltcrete machine, but the daily capacity is held to 2500 8- x 8- x 16-in. or equivalent units by the limitations of the curing kilns. Pipe are manufactured in Quinn steel molds using Syntron electric vibrators to compact the concrete.

Having four principal lines of goods is the means of stabilizing operations and employment. During the depression, when building was low, the mainstay was concrete pipe for sanitary projects built under the PWA. Pipe volume is relatively low now, but building is good, and concrete block and cast stone are the bulk of the business. The company employs 12 men in the plant, all of whom have five or more years of experience in the manufacture of all lines of products. It's an ideal setup that keeps the men employed practically the year around.

Plant Is Advertisement

One of Mr. Olsen's best visual ads is his plant and office, which are combined in one building. The building, of concrete masonry painted white, has the company name "Badger Concrete Co." painted in big white letters against a black background on all sides where traffic can see it. Truckers are also attracted by signs on the superstructure which can be seen a long way. This is in sharp contrast to the average concrete products plant which has no advertising value. Maintenance of the signs and exterior of the building are provided for in the operating budget and amount to approximately two dollars a week.

The accompanying illustrations show how effective a sign display can be, especially when backed up by a neatly-arranged stockpile of units in the yard, and a display of the company's products on the street side of the office. Mr. Olsen's office is kept spotlessly clean and attractive, and the walls are alive with photographs of finished jobs of Badger precast concrete.

Most of the business outside Oshkosh, except for cast stone, is in a 100-mile east-west direction which embraces a number of small towns and the farming area. The general run of business is handled by eight Badger dealers who do not carry units in stock except for fractions of a truck-load. Mr. Olsen's advertising is designed to help these dealers, and in addition, he and a full-time salesman paid on commission are active in selling large outlying jobs.

Front of office is used to display every type of product made. To the left may be seen a sample of "Mo-Sal" cast stone

Newspaper Advertising

Newspaper advertising is generally considered a controversial medium for construction materials, and there isn't much doubt that it would be expensive in many large localities where high circulation must be paid for. Mr. Olsen has used newspaper advertising for several years and intends to continue to do so. His is the long-range point of view of keeping his company name constantly in the foreground with a definite percentage of income set aside to cover the costs of advertising and promotion.

Newspaper copy is prepared by a local advertising agency with the object of getting inspired messages over to the reader. The ads shown herewith are of the kind featured in every Saturday's issue of the *Oshkosh Daily Northwestern*. They have a breeziness in style and an attractiveness that are

INFRINGEMENT NOTICE

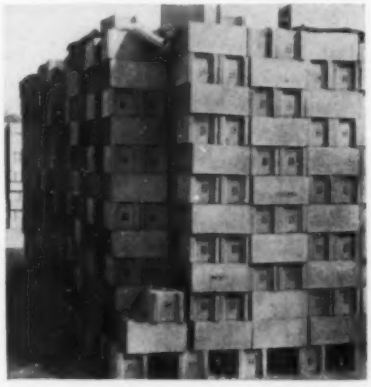
To Builders and Users of Block Machines

Please take notice that the Stearns Manufacturing Company of Adrian, Michigan, are the sole and exclusive licensees of "Joltcrete" vibration block machine patents and patent rights and have the sole and exclusive right to manufacture and sell such equipment.

At the present time there is a suit for patent infringement pending against a New York concrete products plant (name given upon request), a user of infringing equipment. Others manufacturing infringing equipment and the users of such equipment will be prosecuted to the fullest extent of the law.

Louis Gelbman, Inventor
Suite 2001, 350 Madison Ave., New York, N. Y.

distinct. Copy is prepared from information developed and used by the Portland Cement Association on a national scale, adapted to the local product and style. Some of the ads feature local buildings being constructed of Badger building units. At regular intervals concrete vaults are featured. This newspaper with a wide



Corner of block storage pile. It will be noted all block have trade mark cast into them

circulation outside the city proper has coverage in the territories served by the dealers. Attention is called to these dealers in many of the ads.

Demonstration Houses Help Sales

Back in 1938, Mr. Olsen built a demonstration concrete house which was featured in a paper presented before the National Concrete Masonry Association convention in Chicago in February, 1939. A series of ads was run during the construction telling of the progress made and, when completed, a big advertisement announced the opening date. Something like 1300 people went through the house on opening day and 3500 in three weeks time. Appropriate souvenir folders were handed out in the house. This was followed by construction of some 15 concrete houses. The big advantage in building a demonstration concrete house turned out to be the breaking down of sales resistance to concrete masonry on some large jobs involving 50,000 to 60,000 units for backup that came up later.

Adopt Trade Name

In line with the policy of clever advertising, when the company purchased its new block machine the name "ShocKrete building units" was applied to the new units. The name is distinct and tends to arouse curiosity. These vibrated block are advertised as such in the local telephone directory and other media. A special advertisement was run featuring "ShocKrete" units and contractors, engineers and city officials were all invited to a party at the plant to see the new machine in operation. Proofs of the advertisement were then used as stuffers in direct mail promotion.

Use Direct Mail and "Good Will Builders"

Direct mail to contractors is handled on regular schedule and for years the company has carried small advertising space on cast stone in *Western Builder*, a weekly state-wide paper published in Milwaukee.

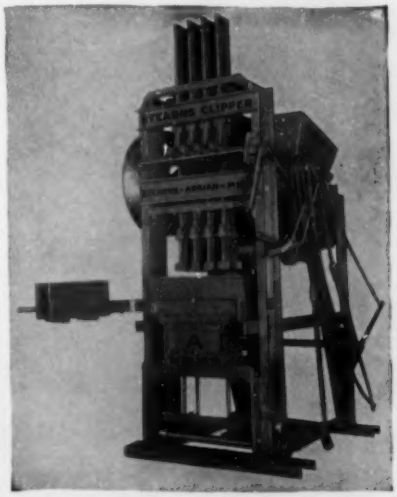
All this advertising is supplemented with miscellaneous ideas to keep the Badger Concrete name always in front of architects, contractors and engineers. Desk pads with the name of the architect printed on them, attractive calendars and mechanical pencils are examples of the types of advertising premiums used. An attractive pencil with "Thank You for Your Order" printed on it is handed to each individual when he places an order or pays his bill. Each Fall, as cold weather approaches, a supply of accurate outside thermometers is distributed to the contractors, who find them valuable for recording temperatures and as a precaution against too cold weather for concreting. If the contractors don't get them they ask for them.

Types of premiums are changed often to avoid monotony and to find out which are most desired. Syndicated cards with a colored picture and philosophical sayings are mailed monthly to architects. These cards

(Continued on page 85)

Cement Colors

STAR and ANCHOR
COLORS
Geo. S. Mepham Corp., East St. Louis, Ill.
C. K. Williams and Co., Easton, Penn.



"ANCHOR"

Complete equipment for making concrete, cinder and other light weight aggregate units, including engineering service for plants and revamping of old ones for more economical service. Hobbs block machines, Anchor tampers, Anchor Jr. strippers, Stearns power strippers, Stearns Joltcrete, Stearns mixers, pallets, Straublox Oscillating attachments, etc.

Repair parts for Anchor, Ideal, Universal, Stearns, Blystone mixers and others.

Anchor Concrete Mchy. Co.
G. M. Friel, Mgr. Columbus, O.

Fleet of truck mixers lined up ready to receive loads

Accurate Batch Controls

Cement received in bulk in hopper bottomed cars is dumped below track into screw conveyor that carries it to elevator leading to cement bins

BEFORE BUILDING a new ready-mixed concrete plant this year, the Stewart Sand and Material Co., Kansas City, Mo., inspected and studied many modern ready-mixed concrete operations over the country. Principles of design which experience had proved successful in other plants were adapted to local conditions to make the new plant outstanding. It therefore may be considered as representing the direction in which modern transit mixing plants are going in the handling of materials and batching procedure.

Stewart Sand and Material Co. also operates sand and gravel plants at Turner, Kan., and Kansas City, Mo., and a stone crushing plant at Pixley, Mo., near Independence. Ready-mixed concrete had been under consideration for years as a means of moving more aggregates and giving additional service to the building industry.

The batching plant is located at the foot of Grand avenue on the Missouri River, where the company has a retail plant and distribution bins for sand dredged from the river nearby. Crushed stone for the coarse aggregate is delivered to the plant over the Missouri Pacific railroad or by trucks direct from the producing plant.

Built entirely of steel by the Butler Bin Co., the plant design provides for special handling conditions whereby sand is obtained from two existing sand silos each of which has a capacity of 100 tons.

Bin capacity in the batching plant consists of three compartments, each holding 75 cu. yd. of stone with a spare bin of 30-cu. yd. capacity for handling stone of different gradation for special construction. Sand capacity is 50 cu. yd. in addition to that held in the adjacent retail silos. There are two bulk cement bins, each holding 300 bbl., a third of 30 bbl. for special cements, with two more of 250 bbl. capacity under construction.

Cement Handling Methods

Practically all cement is received in bulk from hopper-bottomed cars, the transfer being made into a cross screw conveyor beneath the track into an enclosed bucket elevator which empties into the cement bins. While unloading a car, air under 80 p.s.i. pressure is introduced into the car to aerate the cement and keep it fluid.

Sacked cement may be handled in either of two ways. Small amounts can be elevated from the cement warehouse to the batching floor by a cement elevator which is a continuous belt with cross spacers to hold each sack. The alternative is to empty the sacks into the enclosed screw conveyor from the railroad cars through a special sealed hopper provided for that purpose. This cement is elevated into the 30 bbl. bulk cement bin.

Crushed stone ordinarily is delivered to the plant in hopper-bottomed cars. Bottom gates release the stone

Left, above: Operating bulk cement batcher. Air valves above signal lights with convenient push button controls located below, to the right. Below: Side view shows A, B, C lettered valves controlling flow of three cements. Electric vibrator on chute below which releases excess cement into bucket elevator

In New Plant

General view of ready mixed concrete plant with stone conveyor shown to right

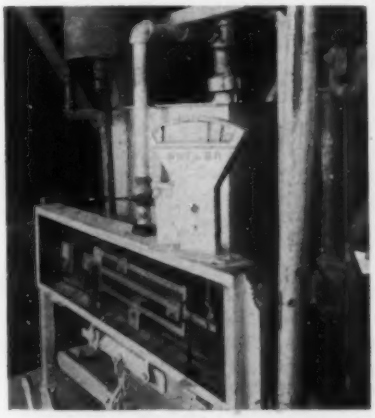
through a hopper onto a 24-in. Link-Belt pan feeder which transfers to an 18-in. belt conveyor, 160-ft. centers. At the head of the plant, a swivelled spout is turned by means of cables on the batching floor to drop the stone into either bin compartment. A 70-ton car is unloaded in about 40 minutes.

Sand taken from Missouri River beds is stocked in the two previously-mentioned concrete silos which butt up against the ready-mixed concrete batching plant. These silos always carry two separate grades of sand. One is a normal coarse grade concrete sand dredged from the deep river beds, and the other is a fine sand obtained by selective dredging on the shallow bars. The fine sand contains about 10 percent minus 20- plus 40-mesh, 45 percent minus 40- plus 80-mesh, 40 percent minus 80- plus 200-mesh and 5 percent through 200-mesh.

Blending Aggregates

A blend of the two sands is made in producing ready-mixed concrete, by proportioning a definite percentage of each into the batching plant bin in order to get the desired fines.

A hole was cut into each concrete silo near its bottom, and an open-top screw conveyor was inserted horizontally inside each silo, one having a 9-in. diameter and the other 12 in. Each conveyor travels toward the bucket elevator, and the speed of sand fed out from each silo is regulated by changing the pulley on each conveyor motor drive. Normally the proportions are about four parts of coarse sand to one part of fine sand to arrive at the desired 50-mesh and 100-mesh fractions. Screw conveyors and the bucket elevator were furnished by the Link-Belt Co.



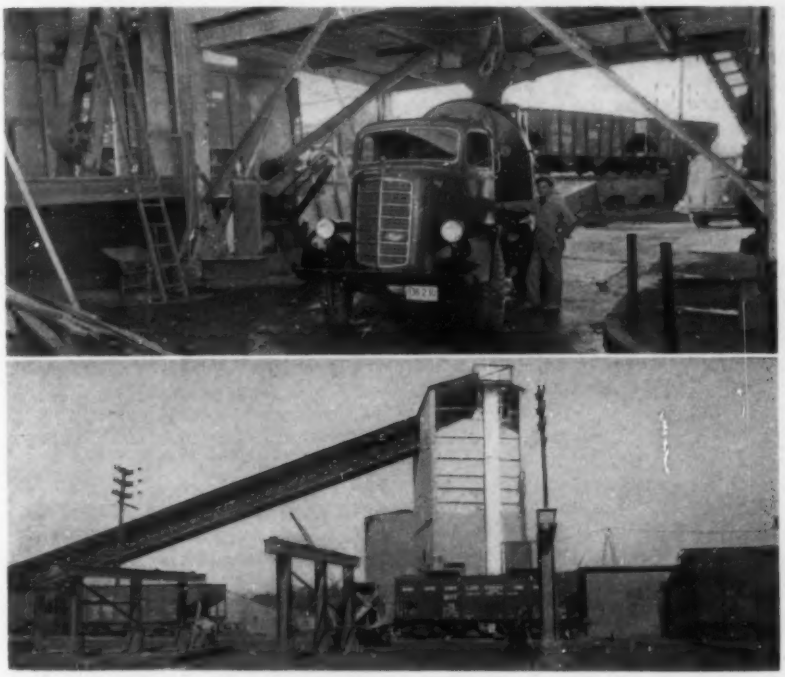
Weighing apparatus for water

Control Centered on Batching Floor

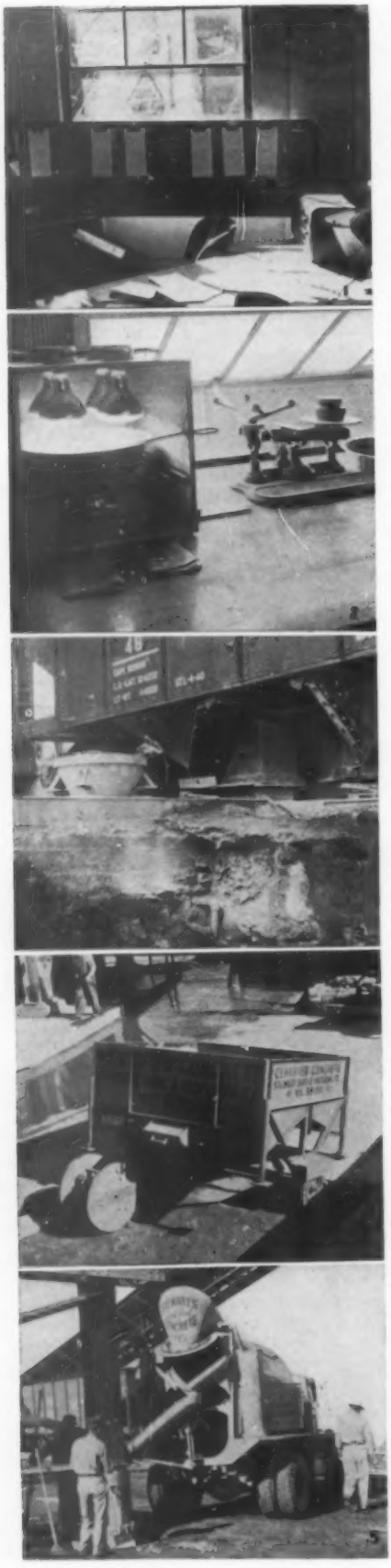
All control of the material handling and batching operations is centered on the batching floor, where the operator has the necessary switches and automatic devices for starting and stopping all the material flow. Push button controls start the transfer of sand from the silos to the sand bin, the conveying equipment in handling cement into the bins, and the cement batching operation. Electric lights at the cement batcher are connected in circuit with Bindicators on top of the cement bins to flash when the bins are nearly full. This is a warning against over-filling, and the cement elevator is stopped or a switch is made to another bin. The lights are turned off by hand.

Batching equipment consists of one 15,000 lb. capacity weigh batcher for aggregates, a separate batcher for cement, and a scale to weigh the mixing water. Hand levers are the means of batching out the aggregates, but the cement batcher has automatic features for greater accuracy. At the operator's station there are three levers, to open either of the three cement bin valves. Cement is transferred from the bin into a canvas-covered vented batcher through horizontal screw conveyors, the travel being first in one direction and then back into the batcher as shown in the illustration. This arrangement, which is designed to level off the effect of surges coming from the bin, is started by the batching operator. All the cement bins are fitted for the introduction of air under pressure to prevent arching and hanging up in the bins, with piping inlets at closely spaced intervals up the sloping edges of the bin.

Cement weighing is an automatic operation after the scale beam is set. Contacts on the scale beam actuate relays which operate a magnetic



Top view: Truck mixer being charged. Note cement sack elevator on left and inclined spout to return excess cement from batcher into cement elevator. Bottom view: Side view of plant, showing stone conveyor enclosed on top and one side



switch cutting in the high speed of a two-winding electric motor driving the feeder. When the cement being weighed approaches full load, the motor speed automatically is cut to one-quarter speed for greater accuracy. The batcher is fitted with a spout through which any surplus cement entering the batcher through flooding is returned into the bucket elevator which fills the cement bins. A push button switch is pressed to start a Foundry Supplies Manufacturing Co. electric vibrator attached to the cement spout to discharge all the cement. Mixing water, cement and aggregates are discharged simultaneously into the truck mixers, the entire cycle being completed in three minutes.

Winter Operation

Provision has been made for winter operation by completely enclosing the batching plant and the installation of heating equipment for the aggregates as well as mixing water. This includes a 32-hp. vertical-type steam boiler for introducing steam through jets into the sand bin and gravel bins, and a Patterson-Kelly storage type water heater. Capacity of the heater is 500 g.p.h. under 10 p.s.i. steam pressure or 900 g.p.h. at 50 p.s.i. pressure. Live steam can also be introduced directly into the water weigh tank.

Concrete in Kansas City is specified on either a strength basis or according to batch proportions. This plant is probably the first to use the principle of radiant heat in heating sand samples to arrive at a moisture determination. Samples are taken in a shallow pan as the sand flows out of its bin into the batcher. A 100-ounce sample is weighed on a balance scale calibrated down to ¼-ounce which gives an accuracy of ¼ of one percent.

Surface moisture is removed in a small cabinet using four 250-watt R-40 Westinghouse infra-red bulbs in preference to the application of heat from an open fire, which is not so uniformly satisfactory. After a 20-minute interval accompanied by an occasional stirring, the sample is weighed and the loss as measured in ounces gives directly the percentage of surface moisture contained in the sample. The lights are connected into the regulation 110-volt lighting circuit.

From top to bottom: 1—Chart with markers to check up truck movements; 2—infra-red lights drying sample of sand for moisture determination; 3—unloading a car of cement dumped into a sealed hopper; 4—close-up of trailer-batcher for wheel-barrow jobs. Note special tires and legs. 5—Pouring concrete on the job

Delivery equipment consists of 15 T. L. Smith "Smith-Mobile" transit mixers and two Rex mixers of 2-cu. yd. and 2½-cu. yd. rated capacities, respectively, 15 of which are mounted on International and the other two on Mack chassis. Mixers and trucks are all painted a distinct orange color, with the sign "Stewart Certified Concrete" plainly painted on them. Each truck is assigned a number and corresponding blocks, or tabs, are spotted on a chart in the dispatcher's office to show the job to which the truck is delivering.

Keep Accurate Records of Mixer Trucks

Accurate records are kept of each truck's time for a given day. To lessen standby time a trailer hopper has been built for use on jobs where wheelbarrows on concrete buggies are used. This hopper, which measures 6- x 6½-ft. in plan, has a capacity of 3½-cu. yd. of concrete with two discharge gates on opposite sides. It is pulled behind a truck on pneumatic tires and when stationed on the job is supported by steel legs. Overall height is 5½ ft. which is low enough for direct loading from the transit mixers and yet high enough to accommodate wheelbarrows and concrete buggies at two outlets.

John Prince is president of the Stewart Sand and Material Co.; George W. Garrett is secretary-treasurer and George H. Cook is superintendent of operations.

Big Ready Mix Job

Gravel Products Corp., Buffalo, N. Y., has completed a large ready mixed concrete contract for the new 6,000,000 bu. Cargill grain elevator in this city. The contract called for 31,000 cu. yd. Concrete storage silos were erected with slip forms, requiring constant pouring. The contractor was H. G. Onstad, Chicago, Ill.

Seek Batching Permit

Acme Sand and Gravel Co., Spokane, Wash., has taken an appeal to the city council from the action of the city plan commission denying the company the right to operate a concrete batching plant with bunkers in the old Hawkeye gravel pit.

•

L. W. Brumm, Inc., Marquette, Mich., has announced a new ready mixed concrete service for this city and the adjacent towns of Ishpeming and Negaunee. Two 2-cu. yd. transit mixers have been purchased. Aggregates will be received by boat from the Inland Lime & Stone Co., and loaded directly into the batching bins.

JAEGER offers you 2 types

—both with the same EXCLUSIVE FEATURES that have made Jaeger the WORLD'S LARGEST SELLING Truck Mixers, Agitators

2 YD. UNIT ON SHORT WHEELBASE FORD-TYPE TRUCK

HIGH DUMP TRUCK MIXERS AGITATORS

IN 2, 3 AND 4 CU. YD. SIZES FOR UTILITY SERVICE

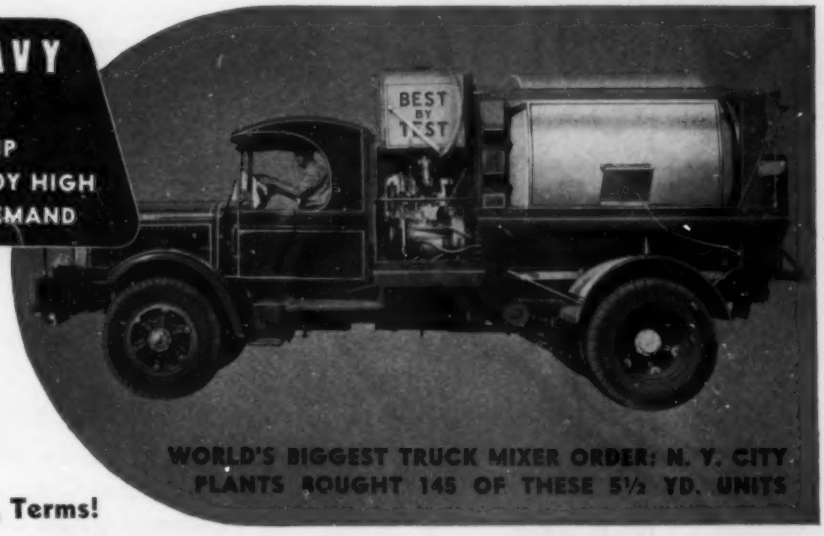
With One-Shot Loading, Dual-Mix Drum and Flip-of-Finger Vacuum Controlled Discharge Door, these units are fastest to load, mix and discharge of any high discharge type on market. More compact for economical mounting, maximum truck payload (2 Yd. can mount on short wheelbase Ford). Meet difficult placing problems (even 2 Yd. can dump into hoppers, big buckets or over dirt piles); fit into needs of small towns as well as fleets of Standard Jaeger units.

In *Both* Types, You Get These Features That *Jaeger Alone Can Offer:*

1. Dual-Mix Drum with Throw-Back Reversing Blades, producing higher strength, more workable concrete as proved by the Hollister Tests.
2. Two-Speed Shock-Proof Transmission with either Vacuum Cab-Controlled Truck Engine Drive or Separate Engine.
3. Sypho-Meter Water Tank, accurate within ½% of tank capacity. Uni-Valve control of mixing, tempering and flush water.
4. Dual Revolving Water Sprays—100% faster, spray uniformly from end to end of drum.
5. Winter-Safety Water Booster.
6. Compactness that permits most satisfactory mounting on short wheelbase Ford-type trucks.
7. Cor-Ten Steel, which resists both corrosion and rust. Highest type automotive construction throughout, insuring lowest maintenance.

STANDARD HEAVY DUTY TYPE

TRUCK MIXER SIZES UP TO 8 CU. YDS. FOR STEADY HIGH PRODUCTION—ANY DEMAND



WORLD'S BIGGEST TRUCK MIXER ORDER: N. Y. CITY PLANTS BOUGHT 145 OF THESE 5½ YD. UNITS

More ready-mixed concrete is being produced with Jaeger Standard Truck Mixers and Agitators than by any other method. From 2 to 8 Yd. sizes they are fastest to discharge, low to load, most economical to maintain. Overwhelming choice of operators who do steady, big volume business.

Send for Catalog, Prices, Terms!

THE JAEGER MACHINE CO.

603 DUBLIN AVENUE
COLUMBUS, OHIO

Calling all Concrete Men to the Concrete Industries Exposition

February 10, 11, 12, at the Sherman Hotel, Chicago

More complete than even the fine show of 1939—occupying new enlarged quarters!

The *only* major concrete machinery exhibition planned in 1941.

That only begins to describe the importance of the 1941 Concrete Industries Exposition. The past year has been no ordinary one in the advancement of concrete equipment design. All kinds of new and more efficient tools, accessories, mechanical devices and materials await your inspection.

Come and mix with the boys, and see these units that are going to *affect your methods, your bids, your profits in what promises to be a boom construction year.*

Concrete contractors, concrete products and ready-mix men, home builders interested in the fast-growing use of concrete and concrete products—general contractors, engineers and public officials—this is YOUR show! Plan now to attend.

COME... SEE HOW IT'S DONE IN '41
CONCRETE INDUSTRIES EXPOSITION
CHICAGO
FEB. 10-11-12

Held concurrently with the annual conventions of

National Concrete Masonry Association
American Concrete Contractors Association
National Cinder Concrete Products Association
American Concrete Pipe Association
Cast Stone Institute **Illinois Builders' League**

Advertising That Pulls

(Continued from page 79)

are designed to stand up as a desk ornament.

As an example of his other activities aside from production and merchandising, Mr. Olsen is running an experiment on paints used to coat concrete wall surfaces in order to develop information that can be passed along to contractors and builders.

About a dozen paints of different composition and color were used to paint the entire outside wall of the plant away from the street side. These are of different bases—cement, rubber, oil and creosote—to determine the relative values when subjected to normal conditions of sun and weather and heat from within and cold from without. He intends to develop some worthwhile information on surface checking, cracking, water resistance, discoloration, life and other qualities of each.

Making Special Cast Stone

Recently the Badger Concrete Company became associated with Mo-Sai Associates, an organization formed by Mr. Louis Falco of The Dextone Co., New Haven, Conn. The purpose of this association was to have a group making a uniform product in any part of the United States. The Badger Concrete Co. has as its territory Wisconsin, Illinois, Minnesota and Upper Michigan. Mo-Sai is a new type of cast stone which until recently had been produced only in the east but is now being introduced on a nation-wide plan.

Herman Frauenfelder, formerly president of the Cast Stone Institute, is executive secretary of Mo-Sai Associates. He has recently completed an extended stay at the Badger plant to instruct the personnel in the technique involved in manufacture and job application of Mo-Sai. This material is designed for remodeling store fronts, new store-buildings, structural decorative facing for large buildings—such as theatres, churches, schools, trim portions of buildings, facades, architectural concrete murals, etc. The material is only 2 in. thick and is produced in slabs up to 100 sq. ft. in size. Exposed aggregates of granite, quartz and others of vitreous character are used to make interesting surface textures in a variety of color patterns. Mo-Sai Associates carries advertising in Sweets Catalogue. This is available to the members in reprint form to be mailed out in the territory served.

- Vibration
- Pressing
- Uniform Density
- Trowelled Surfaces

Write for Information

KENT-ROOT VIBRA-PRESS

The KENT MACHINE CO.
CUYAHOGA FALLS, OHIO

SURE CONCRETE BRICK CAN BE MADE WITHOUT PALLETS ON THE

JACKSON CONCRETE BRICK MACHINE

Just Think What This Means in Dollars and cents saved in handling and upkeep as well as the cost of the pallets themselves.

Investigate today the most efficient and up to date concrete brick making equipment on the market.

JACKSON & CHURCH CO.
SAGINAW, MICH.

CONCRETE PRODUCTS
Consultation Service

In these pages, month after month, is published the most helpful information obtainable about the manufacture and sale of all kinds of concrete products. If you need further details about any of this material or about concrete products equipment our staff of engineer-editors will be glad to serve you. Producers everywhere are taking advantage of this extra service. Write us about your problems.

ROCK PRODUCTS
309 West Jackson Blvd. Chicago, Ill.

MANY FEATURES OF MERIT IN FAVOR OF "COMMERCIAL" PALLETS

PERMANENT EQUIPMENT—WE DO NOT KNOW OF A PRESTEEL PALLET CUSTOMER REPLACING WITH ANY OTHER TYPE.

LIGHT AND EASY TO HANDLE AND STORE.

MAKES A FIRM ANVIL FOR TAMPING—PRESSED COLD IN DIES—UNIFORM—RECOMMENDED BY BLOCK MACHINE MAKERS—ASK US OR YOUR MACHINE MAKER.

MANY DIFFERENT STYLES AVAILABLE.

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

Smoot Denies It Is Monopoly

SMOOT SAND AND GRAVEL CORP., Washington, D. C., has denied the charge brought by the Department of Justice that it was engaged in illegal monopolistic practices. The corporation asserts its volume of business is "due to the high character and efficiency of the services it provides for its customers." At all times, the company stated, the prices of its products have been substantially lower than prices in other cities on the Atlantic seaboard. The company conceded the purchase of the Columbia Sand and Gravel Co., eliminated the competition of that concern, but denied that it thereby acquired 90 percent of the sand and gravel business in this territory. Many other companies producing sand and gravel have been organized in this territory since 1931 when the Columbia company was purchased.

New Rock Wool Plant For Oklahoma

FEDERAL BUILDING MATERIAL CO., recently placed in operation a rock wool plant at Sand Springs, Okla. F. J. Pierce, a Tulsa insulation distributor, and R. H. Clarkson organized the company which not only produces the rock wool but also distributes the product through dealers. Robert H. Dott, director of the Oklahoma Geological Survey, is credited with discovering the rock formation in central Oklahoma which is said to be almost ideal for the manufacture of rock wool. A special gas furnace, developed by O. J. Nelson, Fort Scott, Kan., is used in making the rock wool. Present capacity of the plant is 10 tons a day.

Buy Island For Gravel Plant

PORTLAND SAND & GRAVEL CO., and the Pacific Building Material Co., Portland, Ore., have purchased a large sand and gravel deposit on Pierce Island in the Columbia River between the mouth of Hamilton Creek and Beacon Rock and plan to start immediate construction of a plant which will employ about 20 men. The property was purchased from the Diamond L Lumber Co. Frank Pennypacker carried on the negotiations for the sand and gravel companies.

Ottawa Silica Building Power Plant

OTTAWA SILICA CO., Ottawa, Ill., is building a new power plant near Mill B, southwest of Mill A and northeast of Mill C, which will be completed and in operation in the Spring of 1941. Conway Pierce will be in charge of the plant.

Three steam boilers, each with a capacity of 450 hp., will furnish the power for the generation of approximately 3000 kw. daily, sufficient to operate the entire plant. The Allis-Chalmers Co. and the General Electric Co. are to install the equipment.

Cement Company Buys Ocean Vessels

PERMANENTE CEMENT CO., San Francisco, Calif., with a new plant near San Jose, Calif., was the highest bidder for two 9600-ton vessels owned by the Panama Railway Steamship Co. The Ancon and the Cristobal were bid in at $76,000 each or a lump sum of $125,000. The purchase was made to enable the company to compete for Panama Canal cement requirements which represent a large proportion of the $300,000,000 construction awards. The New York-Colon run carried cement at $3 a ton less than the West Coast steamship lines, putting West Coast cement shippers at a disadvantage in bidding.

Increase Carloadings of Rock Products

A REPORT of the 13 Shippers Advisory Boards released by the Association of American Railroads indicates a substantial increase in carloadings of rock products. Sand and gravel carloadings estimated for the fourth quarter of 1940 are 320,960 as compared with actual carloadings in the fourth quarter of 1939 amounting to 299,152, a gain of 7.3 percent. Similar comparisons for the cement industry show an estimated total of 146,540 carloads compared with an actual 1939 figure of 137,398 carloads, a gain of 6.3 percent, and for lime products an estimated 40,121 carloads as compared with an actual 1939 total of 36,665 carloads, a gain of 9.4 percent.

Firemanship Talk

ASH GROVE LIME & PORTLAND CEMENT CO., Chanute, Kans., at one of its regular monthly safety meetings had the city fire department lecture on the mysteries of various types of fire extinguishers.

Dustless Cement Patented

A NON-DUSTING PORTLAND CEMENT in the form of tiny pellets or granules which disintegrates into cement particles when added to water used in mixing has been patented by Ira C. Bechtold of Colton, Calif. The patent has been assigned to the California Portland Cement Co., Los Angeles, Calif.

Cement particles are conglomerated into small pellets by blowing the finely ground cement upward in a "shot tower." From the top of this tower, small globules of soap or resin are sprayed. Cement particles rising upward collect on and stick to the globules as they fall through the tower and are carried to the drier.

Here the cement particles on drying are held together into free-flowing, non-dusting pellets. The bond of resin or soap holding the particles together in the pellet readily disintegrates when the pellet-cement is mixed with water.

Safety Trophies Presented by Warner Company

Two handsome safety trophies are to be presented by The Warner Co., Philadelphia, Penn., to the winning plants in two classifications. Presentation of the trophies will be made by President Charles Warner. The two trophies will be awarded each year to the plants or yards presenting the best safety record according to their severity rate standings. One trophy goes to the winning unit, working less than 150,000 man-hours per year, and the other to the winning unit in the greater than 150,000 hours division.

The Van Sciver plant of the company won the National Sand and Gravel Safety Trophy for 1939.

Cement Plant Celebrates 1000-Day Safety Record

UNIVERSAL ATLAS CEMENT CO., Independence, Kans., plant recently celebrated an unusually excellent safety record, having operated 1000 days without a lost time accident since January 18, 1938. This plant has had perfect safety records in 1932, 1933, 1935 and 1939.

Open New Sand Deposit for Asphalt Mixing

THE INTERSTATE AMIESITE CO., Wilmington, Del., has moved its asphalt mixing plant from Kamac, Ga., to Eastman. C. H. Kitchell, who is in charge of this plant, reports that it has a capacity of 800 tons per day of road mix. A five-acre deposit of sand has been purchased to supplement its present source of material to assure ample supplies.

● Regardless of the machine or job—shovel, crane, hoist, scraper, elevator, whatnot—Hazard LAY-SET Preformed will give you the same amazing resistance to fatigue, the same uniformly long life—because Hazard LAY-SET is *"at ease."* The preforming process at the mill relieves the rope of locked up stresses; leaves it flexible, easy to handle, willing to work. Hazard LAY-SET Preformed is so calm, so thoroughly "at ease," that it has almost no tendency to kink, it resists whipping or rotating in sheave grooves, it spools better. More than this Hazard LAY-SET Preformed is a safer rope to handle. Being "at ease" broken crown wires do not spring out to tear workmen's hands and possibly cause blood-poisoning. For your next rope specify Hazard LAY-SET Preformed and be "at ease" yourself about its greater dollar value.

HAZARD WIRE ROPE DIVISION • WILKES-BARRE, PENNSYLVANIA

Established 1846

District Offices: New York, Chicago, Philadelphia, Pittsburgh, Fort Wayne, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

GREEN SIGNIFIES SAFETY

AMERICAN CHAIN & CABLE COMPANY, Inc.

Deepest Limestone Mine

DIGGING OPERATIONS have been started by the Pittsburgh Plate Glass Co. on what is to be the deepest limestone mine in the world. The site is on the Barberton, Ohio, properties of the company's Columbia Chemical division, according to E. T. Asplundh, vice-president.

The mine, reaching a depth of 2200 ft., will supply the large quantities of limestone needed for the company's extensive chemical operations at that point, and in addition, some stone will be sold commercially.

The mine will be located two miles west of the chemical plant from which a connecting electric railroad will be built. The initial production of the mine will be 300 tons per hour, thus assuring an ample supply for the company and its customers.

The area of the mine will be more than 600 acres, which the company either owns outright or on which it has secured stone rights. In general, the limestone mine will be similar to a coal mining operation. Two shafts will be sunk through the 2200 ft. of rock and shale overlay. The limestone will be mined by a "room and pillar" method. Ordinarily, limestone is mined from the surface.

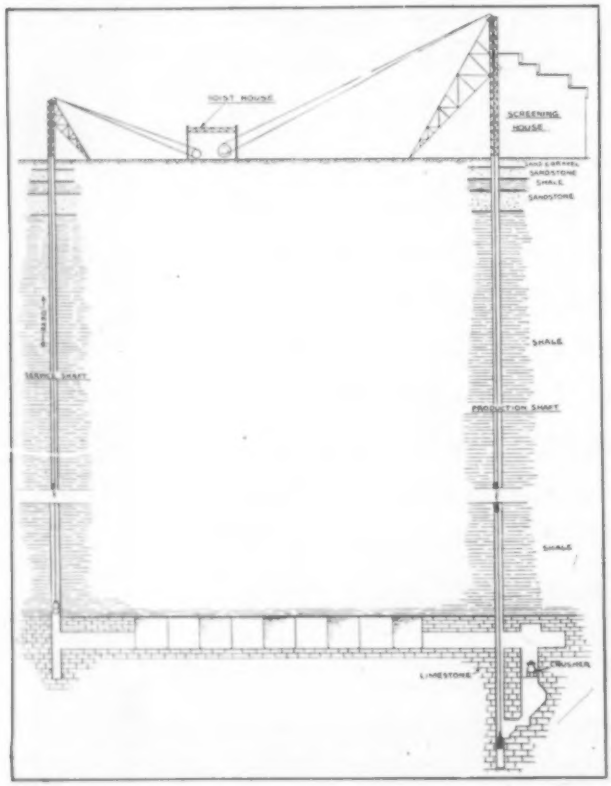
Only the high-grade 40 to 50 ft. top of the vein will be mined. On this basis it is estimated that the Pittsburgh Plate Glass Co. has sufficient limestone reserves to last from 50 to 75 years at the present rate of consumption.

Previously the company's limestone supply was secured from northern Michigan and deposits in Columbus and Zanesville, Ohio. Michigan stone was brought down the lake by boat and shipped by rail from northern Ohio. Because of closed shipping on the Great Lakes in the wintertime it was necessary to build up stocks of stone throughout the summer months in order that a steady supply could be assured throughout the year. The new Barberton mine will eliminate the dependence upon the weather.

It is estimated that the new mine will be in full operation within two years. It is expected to employ about 100 men regularly when in full operation. Most of the construction work will be done direct by the company, although the E. J. Longyear Co. has been employed as a consultant in connection with the shaft sinking.

The shafts will penetrate through the various layers of clay, sandstone, and shale to reach the 2200 ft. deep limestone vein. This is above the salt strata which begins at 2750 ft. The company, through a series of 14 wells, has tapped the salt deposit for many years.

Salt and limestone are the two principal raw materials used by Columbia in its production of such chemical products as soda ash, caustic soda, chlorine, and bicarbonate of soda. These are used extensively in the glass, paper, rayon, textile, soap, and oil industries.



Location of shafts and crushing plant and strata formation in limestone mine being sunk at Barberton, Ohio. Initial production will be 300 tons per hour

Frank W. Renwick

(Continued from page 61)

Renwick and the Chicago Gravel Co.

When the Rockdale plant near Joliet was built again we stepped out and did many things that took great courage on the part of the Chicago Gravel Co. Rockdale's deposit runs very heavily to large rock and as a result we installed more crushers, I believe than were in all of the other gravel plants in the Chicago district at that time. The plant was the largest gravel plant that had been attempted up to that time. It was dubbed by facetiously-minded critics a "White Elephant" but soon proved its worth by turning out the finest crushed and washed gravel ballast that had ever been seen.

It turned the mind of the railroad world to "washed gravel ballast."

During the years intervening between the building of the above mentioned plants, the writer acted continuously as consulting engineer for the company and has thus had the pleasure of a third of a century of intimate contact with Frank Renwick. There was never a time during all this long period that Mr. Renwick once lost his genial, pleasant manner and great consideration for everyone about him, nor did he at any time hesitate to adopt new ideas or equipment that gave promise of a better product for his customers, or an economy in operation, and I feel, therefore, that Mr. Renwick has contributed more to make the sand and gravel business into a recognized industry than any man living today.

I would also like to add that during the above period many people went into the sand and gravel business and Mr. Renwick was constantly appealed to for advice by these people. Somehow he could always find the time to talk to them. He has truly, in my opinion, been the father of the sand and gravel industry.

In closing I want to thank Mr. Rockwood for giving me the opportunity to present this story telling something of Mr. Frank Renwick's great contribution to what is now recognized as one of the foremost industries of America.

A *Ransome* TRUCK MIXER FLEET MEANS

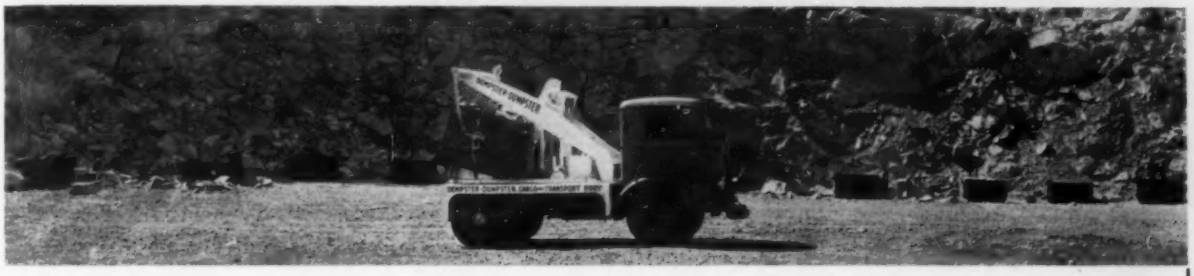
Quality Mix—More Profit—Customer Satisfaction

Six Ransome Truck Mixers Owned by CONSERCO, INC., Washington, D. C.

Write for Complete Information

RANSOME CONCRETE MACHINERY COMPANY

DUNELLEN, NEW JERSEY



DEMPSTER DUMPSTER

THE ORIGINAL BUCKETRUX

Tilt-Top

Drop-Bottom

Here is Model 300 LF (3 cu. yd. capacity) mounted on 117" wheelbase truck chassis—providing the efficiency of an entire fleet and the costs of a single truck. This powerful unit, like all Dempster-Dumpster units, will handle the Drop-Bottom and Tilt Type buckets (illustrated below) as well as the Skip Type buckets, with equal efficiency. It can also be furnished with a combination cargo and transport body to increase its all-round flexibility. Note the large number of buckets in the background serviced by this one Hoisting Unit. One unit can serve four to ten buckets, depending on the length of haul. Special buckets engineered to meet all conditions.

Investigate—Check with the operators who use them—Write us for details of our trial offer.

DEMPSTER BROTHERS, Inc.

KNOXVILLE • • • • TENNESSEE

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Alpha Portland Cement Co.	$ .75	Dec. 21
Basic Dolomite	.37½	Dec. 16
Canada Cement Co., pfd.	1.25	Dec. 20
Consolidated Cement Corp.	1.00	Dec. 14
Dolese & Shepard	1.00	Nov. 1
Lehigh Portland Cem. Co., pfd.	1.00	Jan. 2
Monolith Portland Midwest, pfd.	.25	Dec. 16
Pennsylvania-Dixie Cement Corp., pfd.	1.00	Dec. 20
Southern Phosphate Co.	.15	Dec. 13
U. S. Gypsum Co., extra	1.00	Dec. 24
U. S. Gypsum Co.	.50	Dec. 31
U. S. Gypsum Co., pfd.	1.75	Jan. 2
Wolverine Portland Cem. Co.	.15	Dec. 16

UNITED STATES GYPSUM CO., Chicago, Ill., realized a net profit of $1,713,781 for the quarter ending September 30, 1940, compared with $2,613,003 for the corresponding period in 1939. This difference in earnings may be attributed to the larger federal taxes, the company having set aside $1,394,916 for excess profit taxes and increased normal taxes for both the quarter and the first six months of the year. Under the old tax rate, the net profit would have shown an increase of $495,694.

•

SOUTHERN PHOSPHATE CORP., Baltimore, Md., with seven plants in Florida, had net sales of $972,106 for the year ended December 31, 1939, as reported to the SEC. This compares with $854,893 for 1938. Cost of sales in 1939 was $790,711, and the gross profit was $181,395.

•

NAZARETH CEMENT CO., Nazareth, Penn., had a net profit of $163,300 for the year ended December 31, 1939, compared with a net loss of $14,706 for 1938.

•

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., on August 12, 1940, sold an issue of $3,250,000 first 4½s due February 1, 1953 to an insurance company.

•

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., reports for the twelve months ended September 30, 1940, a net profit of $2,011,556, after Federal income taxes, depreciation, depletion, obsolescence, etc. This compares with a net profit of $2,062,255 for the twelve months ended September 30, 1939.

•

PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., has issued the following comparative statement of earnings for the twelve months ended September 30:

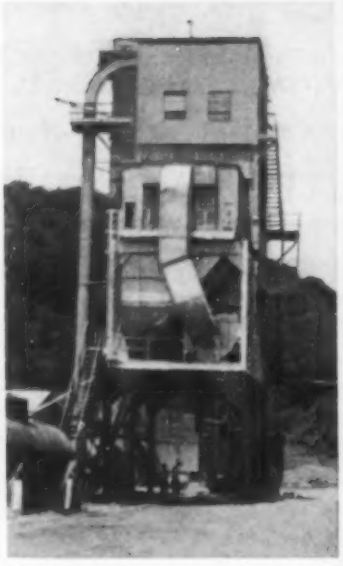
	1940	1939
Net sales	$6,886,093	$6,047,850
Costs exp., ord. tax, etc.	5,409,785	4,825,749
†Depreciation and depletion	458,099	489,305
Oper. profit	$1,018,209	$ 732,796
Other income	19,923	32,922
Total income	$1,038,132	$ 765,718
Interest	388,015	410,707
*Profit	$ 650,117	$ 355,011

*Before federal income taxes. †Total depletion and depreciation charges amounted to $982,533 for the 1940 period, of which $458,099 (basis used for present federal income tax purposes) was charged to operations. The balance of $524,434 was charged to special reserve.

The above excellent earnings statement reflects the large volume of con-

MODERNIZE YOUR PLANT WITH

PARSONS OVAL BAG DUST ARRESTOR



From your crushers, from your screens, bins, elevators—everywhere you rehandle your stone, you are sending dust into the air, spreading it on the floor, steps, turning your plant, which would otherwise look neat, into a place even your employes think of without pride. It filters into your bearings, your motors, your lungs.

Collect it! Sell it!

It doesn't cost much to do this. A Parsons Unit type Dust Arrester, built to handle 2,000 cu. ft. of air, complete with fan and 5 hp. motor, costs surprisingly little. It comes ready to set in place and connect the dust pipes. Simple but highly efficient.

You can afford it. And when you figure it out, you can't afford to be without it! Get more information today.

A Complete Line of Dust Arrestors

Automatic . . Oval Type Bag . . Unit Type Oval Bag . . All Metal Parclone

PARSONS

PARSONS ENGINEERING CORPORATION

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struction undertaken in connection with the defense program, and the continuance of industrial and home building on a large scale. Recently the company took steps to cut down its fixed charges by refunding its outstanding 6 percent first mortgage bonds through the sale of a new first mortgage and the creation of a bank loan.

•

BASIC DOLOMITE, INC., Cleveland, Ohio, reports a net profit of $160,775 for the quarter ended September 30, 1940, after provision for federal income taxes at the 24 percent rate. This compares with $119,160 for a similar period in 1939. Nine months net profit was $322,969 as against $184,714 in 1939.

•

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, has called the balance of $2,280,000 serial 10-year 1st mortgage and convertible collateral trust bonds issued in 1935 with a graduated scale of interest, ranging from 3½ to 5½ percent. The portion being called November 30 amounts to $1,096,000. The remaining interest rates are 5¼ and 5½ percent. It is reported that a loan at the unusually attractive rate of 2 percent will be made by three Cleveland and one New York bank to finance the bond redemption.

•

SCHUMACHER WALL BOARD CORP., Los Angeles, Calif., is expected to show a net profit for the three months ended October 31, 1940, considerably above the previous quarter's net result of $44,772. Earnings for the three months ended July 31, 1940 were the third highest for any quarter in the company's history, despite the fact that plants were shut down nearly a month while manufacturing operations were moved from the old site to the company's new plant. Increased profits were attributed to the new plant which uses specially designed calcining methods.

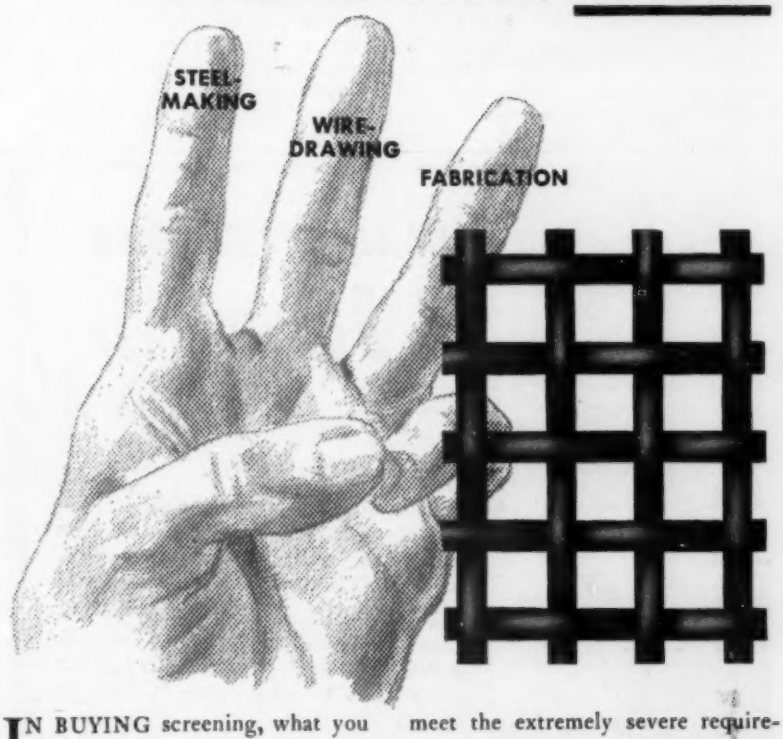
•

PLANS for the reorganization of the Chemical Lime Co., Bellefonte, Penn., under which the National Gypsum Co. will take over operation through lease, have now been revealed. The National Gypsum Co. will assume the principal indebtedness due to the Reconstruction Finance Corporation to the sum of $707,120 and guarantee to the RFC payment of the principal and interest thereof as well as the principal and interest of an additional $350,000 which the RFC agrees to invest in further improvements to the plant and on all of which investment they agree to accept interest at the rate of 3 percent per annum.

UNDER **ONE CONTROL**

FOR ONE PURPOSE

—SCREENING THAT *ENDURES*



IN BUYING screening, what you look for is endurance. And in Screening, endurance begins with steel... steel that can be drawn into the toughest, strongest and most abrasion-resistant wire possible.

Ordinary steels won't do. That's why Roebling makes every pound of steel that goes into Roebling Screening. This steel is made in small "heats", in special small open-hearth furnaces. Because only in that way can the exact characteristics required be developed under sufficiently close control.

In other words, the steel used by Roebling is actually custom-made to meet the extremely severe requirements of good screening service. So, too, with every step in the wire-drawing—and the fabrication of the screening itself. It's all done by Roebling —under *one* control, for *one* purpose —to make Roebling Screening outstanding, wherever used, as the screening that *endures*.

You can obtain Roebling Wire Screenings for every sizing, cleaning and grading service. We invite your inquiry for any of the various types and metals.

JOHN A. ROEBLING'S SONS CO.
TRENTON, N.J. *Branches in Principal Cities*

ROEBLING ABRASO SCREEN

TRADE JERSEY MARK

NEARLY 100 YEARS OF WIRE FABRICATING SPELL THE DIFFERENCE

Blend Portland With Natural Cement

EXPERIMENTS are being conducted by the Minnesota Highway department with the use of natural cement blended with portland cement. A half mile of concrete highway, using the blended cement, was laid this summer just west of Mankato. Natural cement is produced in Mankato by The Carney Co., which also has a rock wool plant at this location. As 2,000,000 bbl. of cement are used annually in Minnesota, it is estimated that a blei with 15 percent of natural cement would require 300,000 bbl. Certain advantages are claimed for the blended cement concrete, including resistance to chipping under the influence of salt.

The Carney quarries include about 1000 acres of limestone 40 ft. thick. Through the middle of the strata runs a 3-ft. layer of shaley pink limestone which is used for rock wool. The company makes a masonry cement by mixing the clayey limestone at the bottom with higher calcium limestone from the top. Natural hydraulic cement is made entirely from the bottom strata.

To Build Cement Plant Using Marble Deposit

CARRARA PORTLAND CEMENT CO., Reno, Nev., has been incorporated for the purpose of building a cement plant near Carrara, Nev., eight miles south of Beatty, Nev., in Nye county. The company plans to start construction immediately. It is believed that the new cement plant will use the marble deposit near Carrara for raw material in the manufacture of a white portland cement. John Lewis is president; Clyde C. Sherwood is secretary; and O. J. Gallaher is treasurer. All officers live in San Francisco, Calif. Emerson J. Wilson, Reno, Nev., is attorney for the corporation.

Open New Gravel Deposit

THE BECKER COUNTY SAND & GRAVEL CO., Detroit Lakes, Minn., has exercised options which it has had on a large gravel deposit located three miles north of Cheraw, S .C. Machinery is now being installed for the plant which will have a capacity of 15 to 20 cars per day. A large part of the output will go to the Santee-Cooper dam project.

Motor Progress Exhibit

GENERAL ELECTRIC CO. gave a presentation of "100 Years of Motor Progress in 100 Minutes" in the General Electric Building, New York City, on November 8. The particular occasion for this exhibit was the introduction of a new line of polyphase induction motors.

To remove filter bag, unhook as shown. There is ample room to do this.

After unhooking, the bag can be pulled out into the clean-air chamber.

Remove spacers from the inside of the bag.

★

IN MAINTENANCE

SLY DUST FILTERS

are Simplicity itself!

★ Unsurpassed ease of maintenance—that's one reason why Sly Dust Filters far outnumber any other make in U. S. and Canadian cement mills.

Sly Dust Filters are easy to service because of their unique design and simple construction. There is plenty of room for easy access to every part of the assembly.

The filter bags last a long time but when some do need replacing, then there is no problem, as illustrated at left. This quick simple process can be performed without interruption of service. Replacement bags are cheap.

Sly installations not only require a minimum amount of time for maintenance, but also make definite savings in space and power. Consult us about your dust problem in crushing, grinding, screening and conveying rock products. Ask for our new Bulletin No. 98.

Sly Filter exhausting Packing Machines & Conveyors in large Cement Plant.

THE W. W. SLY MFG. CO.

Branch Offices in Principal Cities

4746 Train Avenue Cleveland, Ohio

COMING CONVENTIONS

National Sand and Gravel Association and National Ready Mixed Concrete Association, Netherland Plaza Hotel, Cincinnati, January 15, 16 and 17.

National Crushed Stone Association, Netherland Plaza Hotel, Cincinnati, January 20, 21 and 22.

American Road Builders' Association, New York City, January 27, 28, 29 and 30.

National Concrete Masonry Association, Sherman Hotel, Chicago, February 10, 11, and 12.

American Concrete Pipe Association, Edgewater Beach Hotel, Chicago, Ill., February 13 and 14.

American Concrete Institute, Mayflower Hotel, Washington, D. C., February 18, 19, and 20.

Must Pay Over Time Despite Contract

EXISTENCE of a union contract calling for a workweek of more than 40 hours without the payment of overtime, except in certain instances, does not free the employer from his obligation to pay time and one-half after 40 hours.

However, under Section 7 (b) of the Act employes working under agreements providing for an absolute maximum of 1000 hours work in any 26-week period or 2000 hours work in 52 weeks may be worked up to 12 hours a day and 56 hours a week without the payment of overtime. The agreement must be made as a result of collective bargaining by representatives of employes certified as bona fide by the National Labor Relations Board, and there should be a provision for a fixed annual wage or continuous employment for either 52 weeks or 2000 hours in the agreement limiting the hours of work to 2000. Should 1000 or 2000 hour maxima be exceeded, overtime is due the employes for all hours in excess of 40 in any given workweek.

Sand-Lime Brick Production and Shipments

ELEVEN active sand-lime brick plants reporting for October and seven for September, statistics for which were published in November.

AVERAGE PRICE FOR OCTOBER

	Plant Price	Delivered Price	
Grand Rapids, Mich..		$14.00	
Milwaukee, Wis.	$10.00	12.00	
Mishawaka, Ind.	10.50	....	
St. Louis Park, Minn..	8.00	9.50	
Seattle, Wash.	14.00	15.00	
Sebewaing, Mich.	10.00	....	
Syracuse, N. Y.	14.00	16.00 20.00	C/L L/C
Watertown, Mass. ...	12.50	13.50	

STATISTICS FOR SEPTEMBER AND OCTOBER

	†September	‡October
Production	1,624,645	3,349,245
Shipments (rail)...	82,000	197,800
Shipments (truck) .	1,913,031	3,647,092
Stock on hand.....	776,855	1,398,499
Unfilled orders	775,000	1,900,000

†Seven plants reporting: incomplete, one not reporting production, two not reporting stock on hand and three not reporting unfilled orders.

‡Eleven plants reporting: incomplete, one not reporting production, two not reporting stock on hand and five not reporting unfilled orders.

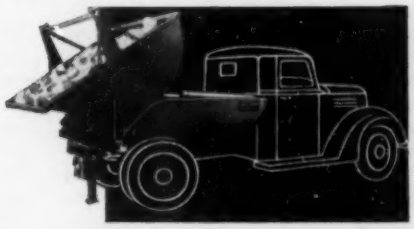
Concrete Pavement Yardage

AWARDS of concrete pavement for October, 1940, have been announced by the Portland Cement Association as follows:

	Square yards awarded during October	first 10 months
Roads	3,673,252	33,392,008
Streets & Alleys...	2,286,941	15,041,891
Airports	921,932	4,002,619
Totals	6,882,125	52,436,518

Double-Quick Dump saves time

Only 15 seconds for dumping or picking up loaded bucket . . . by powerful double-action hydraulic hoist, controlled from cab. Easy to spread or spot load as desired.



Brooks MODEL "CH" LOAD LUGGER
(Reg. Trade-mark)

NOTE:—Try out the Load Lugger on the job . . . Ask about our Special Introductory Offer.

Compact *streamlined* design with extra sturdy welded construction.
Readily mountable on any standard truck chassis within 6 ft. length.
Unique jackleg supports overhanging load and relieves truck from strain.
One-piece buckets, welded and reinforced. For wet or dry materials.
Built in sizes from 1½ to 4 cu. yds.
Write for Bulletin

Brooks EQUIPMENT AND MFG. CO.
KNOXVILLE - 812 Davenport Road - TENNESSEE
Distributors in all Principal Cities

A UNIVERSAL CRUSHING PLANT *means* BUSINESS!

Because you can deliver the goods—to meet specifications—and you operate at a profit. Operating and maintenance costs are extremely low—gross profits per ton are really high.

The Universal Plant above, in southern Illinois, is making a nice profit. Produces agricultural lime, chips and aggregates with a Universal No. 1 Pulverizer, a 1020 Jaw Crusher, Rotary Screen and Elevators.

There are Universal Plants like this all over the country—stationary, portable and semi-portable and wherever they are it means business—profitable business!

Let us put you in touch with the Universal service-dealer near you—he'll give you the facts black on white.

UNIVERSAL CRUSHER COMPANY
617 C Avenue West, Cedar Rapids, Iowa

UNIVERSAL

Industrial Sand Producers Meet

(Continued from page 58)

State ceramic industry. As to occupational disease legislation, it was reported that no new statutes were passed by the States in 1940, but that some are likely to be passed in the coming year when most of the State Legislatures will meet.

Employment policy to be followed under the Selective Service Act was covered thoroughly by Mr. Ahearn. He emphasized that employers should be certain in hiring men to replace draftees that these men be informed that their jobs are temporary, and that temporary employes doing special work know their temporary status in the event they are drafted.

Mr. Ahearn urged the industry to do its utmost to comply with the Act, and suggested that employes drafted be treated as if on leave of absence in matters of company insurance and seniority. Producers were also urged not to discriminate against men between the ages of 21 and 35 years in hiring new employes.

Seasonal Exemption

In reply to a question as to the status of the industrial sand industry in regard to seasonal exemption under the Federal Wage and Hour Law, it was pointed out that the industry is hardly eligible to come under the provisions that 90 percent of the annual production be completed in six months of a year and practically all in seven months. The only possible claim would have been in the case of bonded foundry sand and crude silica and in the case of plants which wash material in a way similar to the sand and gravel industry.

Another subject discussed was the Association's recommendations submitted to a public hearing of the Federal Wage and Hour regulations on October 17 on the subject of the maintenance of records under the Law. The recommendations contained suggestions as to how to keep records of employment to fit employers who pay their employes semi-monthly.

The 1941 annual convention of the National Industrial Sand Association is to be held at the The Homestead, Hot Springs, Va., at a date to be selected in May or June.

A concurrent meeting was held of companies interested in the core sand branch of the industrial sand industry.

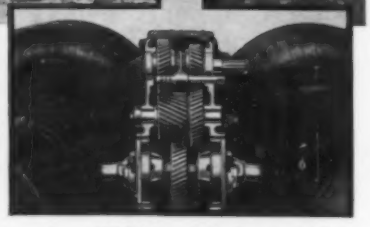
Registration

Those in attendance included: John D. Cronen, Great Lakes Foundry Sand Co., Detroit, Mich.; F. R. Sargent, Bridgeport Core Sand Co., Saginaw, Mich.; W. J. Muhlitner, Great Lakes Foundry Sand Co., Detroit, Mich.; George A. Thornton, and E. Schneider, Ottawa Silica Co., Ottawa, Ill.; Ralph T. Stevens, Cape May Sand Co., Cape May, N. J.; Hamilton Allport, Standard Silica Corp., Chicago, Ill.; A. Warsaw, Wedron Silica Co., Chicago; E. M. Ayers and Russell G. Hay, Ayers Mineral Co., Zanesville, Ohio; E. J. Beyer, Michigan Silica Co., Rockwood, Mich.; T. H. Hardy, C. M. Hardy and Harry Hardy, Houghland & Hardy, Evansville, Ind.; J. W. Whitehead, C. Mathiesen, Whitehead Bros., New York, N. Y.; W. J. Woods, Pennsylvania Glass Sand Corp., Lewistown, Penn.; J. M. Strouss, Deckers Creek Sand Co., Morgantown, W. Va.; Sterling Farmer and A. N. Farmer, Sand Products Corp, Cleveland, Ohio; O. W. Lange, Producers Core Sand Co., Michigan City, Ind.; L. M. Hansen, Industrial Silica Corp., Youngstown, Ohio; and V. P. Ahearn and Stanton Walker of the Association.

Buy Silica Land

HURON RIVER SILICA Co., Rockwood, Mich., has purchased property in this vicinity from which silica will be mined and processed.

HERE'S WHERE THE WORK IS DONE!



TRACTION . . . NOT POWER ALONE IS WHAT YOU NEED

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When there's heavy work to do, TWO driving axles under the load are better than one. Use the

THORNTON FOUR-REAR-WHEEL DRIVE

YOU SAVE MONEY!

Take a truck of 1½ to 3-tons original capacity and let us quickly and at low cost convert it to a husky unit of 30,000 lbs. or more gross vehicle weight capacity.

Two ratios, for power and speed, easily controlled by a lever in the cab. Walking-Beam Flexibility—Special spring construction keeps equal load on all four driving wheels—Perfect balance between power and weight.

THORNTON TANDEM CO.
8701-8779 GRINNELL AVE. DETROIT, MICH.

Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL which gives traction when slippery going makes trucks equipped with ordinary differentials helpless.

"When you need TRACTION you need THORNTON"

LIMA EXCAVATORS

FIT INTO ANY EXCAVATING PICTURE

Whether your work requires a shovel or dragline, you will find in LIMA'S complete line, a machine that will fit your requirements exactly. LIMA excavators are built in sizes ranging from ¾ yard to 3 yard capacity, with ability to handle the toughest job.

1 Special steels are used throughout to effect longer and more profitable operation, with fewer delays.

2 Arrangement of machinery affords proper balance for handling long booms at low angles.

3 Independent clutches—hoist, travel, swing and boom up or down simultaneously.

These are a few of the advantages that are yours when you own a LIMA.

4 Big diameter drums with wide face effect greater cable economy.

5 Roller bearings at every vital bearing point, reduces friction to a minimum.

6 Helical cut gears throughout the main machinery affords smooth, quieter operation.

LIMA LOCOMOTIVE WORKS, INCORPORATED

SHOVEL AND CRANE DIVISION — **LIMA, OHIO**

Newark, N. J. · New York, N. Y. · Dallas, Texas · Portland, Oregon · Memphis, Tenn.
Los Angeles, Calif. · San Francisco, Calif. · Seattle, Wash. · Philadelphia, Pa.
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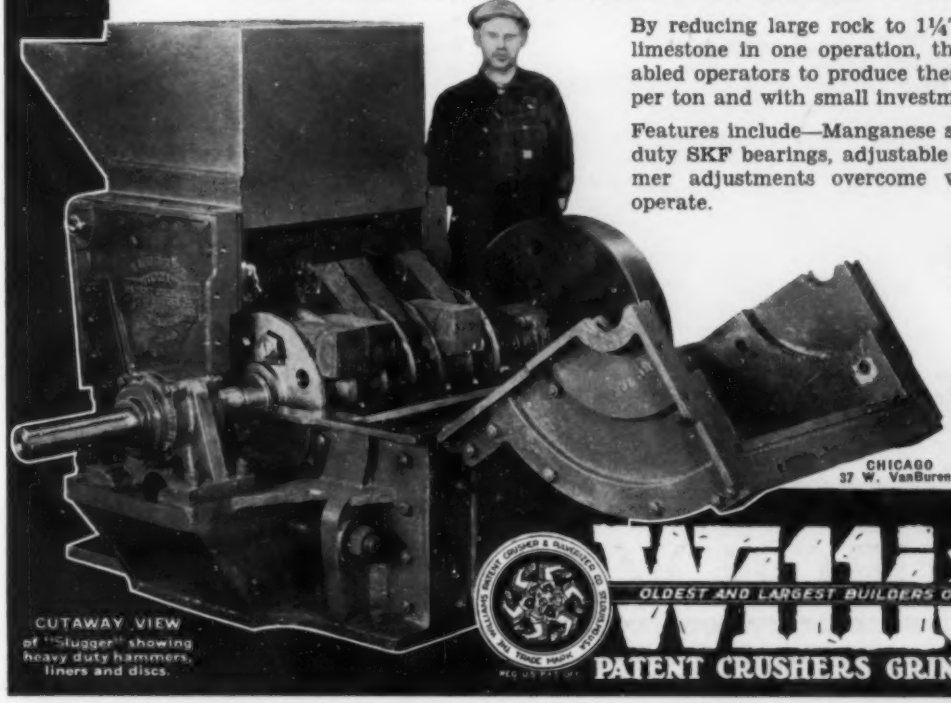
The Williams "SLUGGER" Crusher and Pulverizer Handles "ONE MAN" Stone ● Saves Sledging

Also Makes 1¼", ¾" or Agricultural Limestone in One Operation



CUTAWAY VIEW of "Slugger" showing heavy duty hammers, liners and discs.

By reducing large rock to 1¼", ¾" or agricultural limestone in one operation, the "Slugger" has enabled operators to produce these sizes at a low cost per ton and with small investment.

Features include—Manganese steel hammers, heavy duty SKF bearings, adjustable breaker plate, hammer adjustments overcome wear, economical to operate.

The "Slugger" is built in Seven Sizes—from 30 to 150 horsepower —write for illustrative bulletins today.

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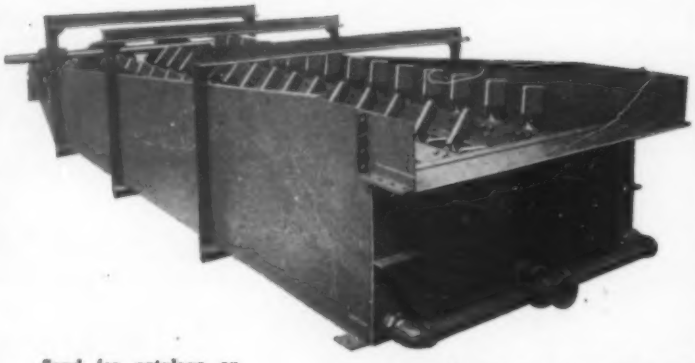

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The powerful churning action of the paddles is highly effective for breaking down and removing those difficult, tough clays and cemented aggregates found in some gravels and stone. Wash water enters through bottom water inlets at each side and center of tub. This gives upward current of water all through the aggregate as it is conveyed up the tub. The upward currents float the sloughage and all light particles of foreign material to the surface where the down and end overflow stream has a chance to sweep the foreign material out of the tub.

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DES MOINES, IOWA

FREE! New Literature

THE bulletins and catalogs described below are for your benefit. To save you the necessity of writing individual letters, those you want can be obtained by merely checking and mailing the coupon on next page.

1 BEARINGS.—SKF Industries, Inc., has issued a 36-page catalog on its spherical roller bearings. The first 20 pages contain illustrations of roller bearing applications in various fields and the rest contains data on selection, time-saving computations, etc.

2 COMPRESSORS.—Chicago Pneumatic Tool Co. Bulletin 726 presents improvements in several details of construction of CP two-stage compressors in capacities of 350 to 10,000 cu. ft. per min. for pressures of 80 to 125 lb. Also included are operating details.

3 CONCRETE BRICK AND BLOCK.—Zagelmeyer Cast Stone Block Machinery Co., has issued two circulars describing the Zagelmeyer system of molding and casting concrete brick and block. Also included is a detailed description of its plant for making precast units, where the system was developed.

4 CRUSHER.—Straub Manufacturing Co., Inc. Illustrated bulletin 39 describes operating results of Kue-Ken crusher installations in a number of plants. Because they crush "without rubbing" Kue-Kens are said to reduce large rocks to a fine cubical product in a single pass.

5 CRUSHERS.—Nordberg Mfg. Co. has published bulletin 97 called "Suggestions to aid in the care of your Symons cone crusher." It contains examples of how faulty operation and improper care sometime lead to crusher troubles.

6 CRUSHERS.—Smith Engineering Works, Milwaukee, has issued bulletin 264E about the features, operation and capacities of its Wheeling jaw and roll crushers.

7 CRUSHERS.—Traylor Engineering & Mfg. Co. Circular No. 1005 is a concise, illustrated presentation of various types of Traylor crushers. The circular also includes a discussion of principles behind the design of the curved concave and bell head features.

8 CRUSHERS AND FEEDERS.—New Holland Machine Co. Bulletin No. 401 is a well-illustrated, 15 page catalog of the New Holland line of roll crushers and conveyor feeders. It also presents data on capacities and plans for several typical installations using this equipment.

9 DUST COLLECTORS.—Buell Engineering Co., Inc. "Dust in Industry . . . Its Control and Collection" contains general information on dust collection and deals specifically with the Van Tongeren Theory of dust collection and its advantages.

10 GEAR REDUCERS.—Link-Belt Co. has published Book No. 1519-A describing the complete line of herringbone gear reducers.

11 DETACHABLE BITS.—Sullivan Machinery Co. Bulletin 87-G presents the improved Sullivan detachable bits which have been designed so that a greater area of the cutting edges are located at the extreme outside diameter where they are most needed, providing broad chopping and reaming edges.

12 DIESEL-ELECTRIC LOCOMOTIVES.—General Electric Co., Schenectady, N. Y., Bulletin GED-803 presents the features of the G-E Diesel-electric locomotives and switchers. It describes their economy of operation and maintenance as well as the variety of conditions under which they operate with ease.

13 DIESEL ENGINES.—Worthington Pump and Machinery Corp. Bulletin S-500-B38 contains complete details and illustrations of the Worthington Type DD totally enclosed, four cycle-direct injection Diesel engines. This engine has been developed for installation where continuous, heavy-duty loads are to be carried.

14 DREDGING PUMPS.—Lawrence Machine and Pump Corp. Bulletin 208-2 describes the construction of the Lawrence line of dredging pumps and includes several views of dredges and tables giving capacities, speeds, and power requirements for different sizes at various speeds.

15 DUST CONTROL.—W. W. Sly Mfg. Co. Bulletin 98, a 20-page illustrated booklet, describes Sly installations for different industries, lists actual accomplishments and emphasizes complete collection by the Sly cloth bag dust filter.

16 DUST CONTROL.—Reese Blow Pipe Manufacturing Co., Inc. Bulletin No. 29 describes and illustrates the Rees all steel, cloth tube dust arrestors, their operation and construction features.

17 GRIZZLEY FEEDER.—Pioneer Engineering Works. Form 536 tells about the operation and design of the Pioneer traveling grizzley feeder, a controlled method of feeding primary crushers and by-passing the undersize.

18 LIMESTONE SPREADER.—Baughman Manufacturing Co. has issued a circular describing and illustrating the features, operation and capacities of the various Baughman limestone carriers and spreaders.

19 MILL EQUIPMENT.—Hardinge Co., Inc., has published Bulletin No. 100 which presents its complete line of grinding mills, classifiers, feeders, etc., and suggests other literature available about its equipment.

20 PLANT EQUIPMENT.—C. O. Bartlett & Snow Co. is distributing its new No. 90 general catalog. It contains 372 pages and gives complete details of Bartlett-Snow elevators and conveyors, chains and sprockets, crushers and miscellaneous equipment.

21 MATERIAL HANDLING EQUIPMENT.—General Conveyor and Manufacturing Co., Inc., has issued a profusely illustrated circular presenting its line of conveyors, elevators, loaders and related equipment.

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22 PREHEATER AND DEHEATER.—Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y. Bulletin No. 401 describes in detail the application of Kennedy stone preheater and deheater to rotary lime kilns.

23 POWER TRANSMISSION EQUIPMENT.—Boston Gear Work, Inc., Boston, Mass., has published a 318-page catalog containing descriptions, specifications and illustrations of its complete line of power transmission equipment: gears, chain and sprockets, ratiomotors and reductors and bearings.

24 PUMPS. — American Manganese Steel Division. Bulletin 940 is about the Amsco-Nagle horizontal and vertical shaft centrifugal pumps, which feature standardization of impeller on three design types plus the two vane trash type to meet varying operating conditions.

25 PYROMETERS.—Leeds & Northrup Co., Philadelphia, Penn. Broadside N-33 is a concise presentation of the complete L&N line of industrial temperature instruments. It describes the important features embodied in each and offers specific publications for more detailed information.

26 REFRACTORIES.—General Refractories Co., Philadelphia, Penn. Comprehensive data on the characteristics, manufacture and applications of Sillimanite refractories are given in the new bulletin No. 209.

27 ROCK GRAPPLES.—Owen Bucket Co. has issued a profusely illustrated booklet about its Type RA rock grapple, pointing out the advantages of the Owen grapple for use in all work entailing the handling of rock.

28 RUBBER, MECHANICAL. — Goodall Rubber Co., Inc., Philadelphia, has issued a new 68-page catalog No. 207. It describes, illustrates and contains specifications and technical data about its general line of mechanical rubber.

29 RUBBER.—The B. F. Goodrich Co., Akron, Ohio. The handbook "Rubber as an Engineering Material" presents in a concise, simple form useful and practical information about rubber as a material —its various forms, its properties, uses and limitations.

30 SAMPLER FOR CLINKER AND CEMENT.—Fuller Co. General Catalog Sheet F-K-9 illustrates and describes the Fuller-Anderson sampler for dry pulverized materials as applied to pneumatic conveyors and also for screw conveyors, spouts, etc.

31 SAND PUMP.—Denver Equipment Co. Bulletin P10-B describes the Denver vertical centrifugal sand pump, said to be capable of handling any material which can be made to flow by gravity to the feed opening.

32 SCREENS.—Hendrick Mfg. Co. has issued a booklet called "Flanged Lip Screens for Sizing and De-Watering." It describes and illustrates the line of Hendrick flanged lip screens, which are said to be particularly effective in screening out slabby particles.

33 SHOVEL AND DRAGLINE.—Lima Locomotive Works, Inc., Lima, Ohio. Bulletin 121-A illustrates and describes the recently announced Lima Type 1201 shovel and dragline. This large capacity shovel is said to have the power and ruggedness required of a big machine, plus the speed and economy of the smaller type.

34 SHOVELS.—Bay City Shovels, Inc., has issued catalog 65-C, describing and illustrating their heavy-duty 1¼-cu. yd. convertible shovel with 20-ton crane rating. The information presented includes specifications, working ranges for shovel, dragline and trench-hoe and crane ratings at various boom radii.

35 TRUCK MIXER JOB HOPPER.—Garlinghouse Bros. Bulletin 54 describes and contains numerous explanatory and job illustrations of the Gar-Bro rotating hopper for truck mixed concrete—a concrete receiver, holding one complete batch deposited by truck mixer for dispensing into carts or wheelbarrows.

36 V-BELTS.—Worthington Pump & Machinery Corp., Harrison, N. J., has issued its "Master Manual," a 72-page booklet discussing power transmission through V-belts and containing many facts, tips and precautions about V-belt operation.

37 VIBRATORS.—Syntron Co. Form 283 contains information about proper application of vibrators to various types of hoppers and chutes, and tells about the use and features of the Syntron electric vibrators, including its new railroad car vibrators.

38 WELDING.—Lincoln Electric Co. "The Lincoln Weldirectory" is a new 56-page catalog of this company's line of welders, electrodes and other welding equipment. It contains numerous references to the proper type of electrodes for best performance in the rock products industries.

39 WIRE CLOTH AND SCREENS.—Wickwire Spencer Steel Co. has issued a 48-page catalog about Wissco industrial wire cloth and woven wire screens. Included is information about the range of sizes available and suggestions for selecting material for a given assignment.

40 WIRES AND CABLES.—John A. Roebling's Sons Co. has published a 35-page catalog of rubber covered wires and cables. It also contains useful information on the selection of cable size. As a guide to the use of this and other information presented, typical examples and their solutions are given.

41 WIRE ROPE.—Broderick & Bascom Rope Co., St. Louis, Mo., has brought out a new edition of its Riggers' Handbook. In addition to containing data on the latest developments in wire rope slings, it gives advice on their care and use, including directions for making various splices, selection of guy lines, calculations for ice and wind loadings on guys and load limits.

42 WIRE ROPE CONNECTORS.—Electroline Co., Chicago, Ill. Bulletin F-2 presents the different types of Electroline-Fiege positive grip wire rope connectors. It also describes their application and contains performance records.

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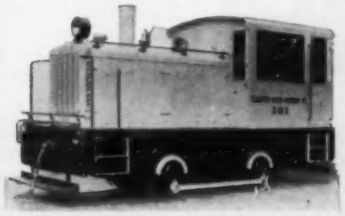

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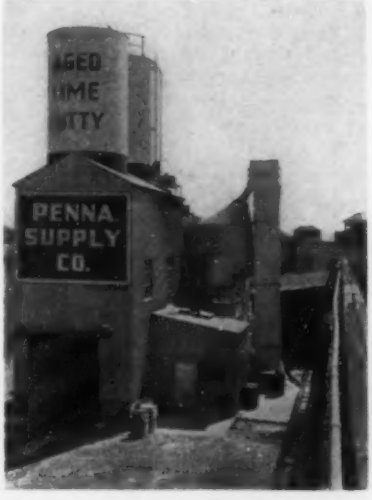
The BROOKS-TAYLOR Lime Putty Plant

AT HARRISBURG

The Brooks-Taylor lime putty plant shown at right was installed in November, 1937, for the Pennsylvania Supply Co. Since that time it has played an important role in the growth of this company. By supplying their customers with aged lime putty, volume was increased and the company's service was extended.

By installing a similar unit you also can take advantage of this extra business. Write our nearest office for information and prices.



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After having been twisted in that muck and run over by trucks, neither cable showed a single leak or break. So far as we know, both are still supplying power at their rated voltages. Many other users report stories of similar harsh treatment, with similar results—little or no trouble. That's why, with tellurium, you can count on saving money by reducing maintenance cost.

If you have need for a tough cable that doesn't mind being dragged through mud or over sharp rocks and gravel, tellurium is your buy. This cable, specially designed for mining machinery, gathering locomotives, electric shovels—for all portable uses—will save you money both on replacements and upkeep.

In addition to tellurium, G-E. has other types of insulated cable to fit every one of your particular needs. If your jobber can't supply you, or if you would like special information, see the nearest G-E Office, or write directly to General Electric, Schenectady, N. Y.

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FEED 900 TONS PER HOUR, SCALPING BOULDERS FIVE FEET IN DIAMETER . . .

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Whatever your job may be, from scalping large stone to making fine grades of material, it can be handled easier and cheaper on a Simplicity. Have our Representatives check your job and recommend a guaranteed installation of Simplicity Screens.

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Increasing Fuel Efficiency

(Continued from page 74)

this type of heat exchanging system it is possible to utilize the heat in the kiln gases to such an extent that the temperature of the gases when leaving the kiln is reduced to approximately 700 deg. F.

The graphical heat balance in Fig. 1-B shows the conditions existing in an efficient, relatively long, lime kiln, equipped with heat exchangers in the feed end, a Unax cooler at the discharge, and suitable insulation of the calcining zone.

This system of utilizing the heat in the gases by means of internal heat exchangers has the advantages of simplicity of operation and low maintenance cost. The heat exchanging system is very flexible, as it will function equally well at the different screen sizes of material.

Grate Type Preheater

F. L. Smidth & Co. have also carried out extensive experiments with another type of pre-heating equipment inside the kiln, consisting of means for actually drawing the hot gases through a layer of material, which naturally, gives a still better heat transfer. A similar pre-heater has been developed by a well-known lime producer, and is now in operation in at least one rotary lime kiln. With this type of pre-heating equipment, it is imperative, however, that the material contain only a small amount of fines, as otherwise the resistance to the gases will be too great, and the gases will carry along too much dust. There is the further disadvantage that it is not possible to regulate the thickness of the layer through which the gases are drawn, and, therefore the equipment is suitable only for crushed stone of a definite range of size.

During recent years, many attempts have been made to design and develop a pre-heater operating outside the kiln, as a separate unit, in which the hot kiln gases are drawn through a bed of material resting on a suitable grate. The most important requirement for a device of this type is means for varying the thickness of the layer to correspond to the size of the stone, so as to avoid excessive resistance to the flow of the gases and yet obtain the desired heat transfer.

In view of the many relatively short and inefficient lime and dolomite kilns in operation today, the successful development of a preheater which may be installed in conjunction with such kilns is of great importance.

The most flexible and satisfactory design of outside preheater employs an inclined grate on which the material is preheated prior to entering the kiln. The grate must have means for conveying the material slowly and uniformly, so as to maintain the proper thickness of the layer through which the kiln gases may be drawn by means of the necessary induced draft fan.

In one preheater installation furnished by F. L. Smidth & Co., the exhaust gases from the rotary kiln enter the preheater at a temperature of approximately 1100 deg. F. and leave the preheater, after having passed through the layer of limestone on the grate, at a temperature of 400 deg. F. In this particular installation, the thickness of the bed of limestone on the grate is about 13 in., and the pressure loss of the hot gases is about 2½ in. water gauge.

Quite recently F. L. Smidth & Co. have adopted for their outside preheater, a special design of inclined grate, the mechanical features of which are similar to the Fuller cooler developed by the Fuller Co. The Fuller cooler is now used extensively in the cement industry and the grate assembly comprises a stationary outer frame and an inner moving frame, to which step grates are fastened, so that the stationary grates alternate with the movable ones. The movable frame with the grates fastened thereto is given a reciprocating motion, which is instrumental in conveying the material uniformly over the grate. After careful experiments at a large size pilot plant, the preheater employing this design of grate has been developed in complete detail for use with material of widely varying screen sizes. A preheater installation of this type is illustrated on page 73.

In conclusion, it may be stated that high fuel efficiency may be obtained, either by the comparatively long kiln with internal heat exchangers, or by the installation of preheating equipment in conjunction with existing relatively short kilns. The decision as to which should be preferred depends to a great extent on local conditions and plant lay-out and also on the type and screen size of the material to be handled.

Lime Concerns Expand

Ada Lime Co., with a plant at Fittstown, near Ada, Okla., has been placed in operation. Pedro Simpkins heads the company, which has several substantial contracts locally and from Oklahoma City for water softening and purifying and for its sewage disposal system. Lime is produced from two or three formations in the Arbuckle mountains near Fittstown.

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Even with the best old-fashioned excavator, your costs can't compare with the economies made possible through the use of a modern, speedy and efficient P&H machine — fastest of its type on the market. Here's all-around economy that's just as important whether you use your shovel 50 or 350 days a year! With alloy rolled steel, welded construction, tractor-type crawlers and split-second control, P&H machines meet today's needs.

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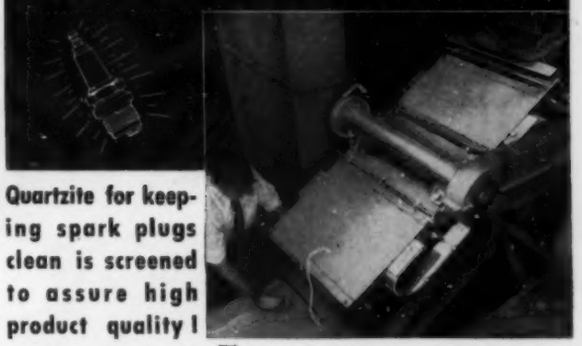

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This Link-Belt vibrating screen removes oversize from quartzite which is used to clean spark plugs. Equipped with a 28-mesh stainless steel wire cloth, and driven by a 1 H.P. motor, this screen protects the quality of the product and assures satisfying results for those who buy it. In countless other applications, Link-Belt vibrating screens are doing an effective job at low cost. Their economy and smooth, dependable performance have won the preference of production men everywhere. Write today for Book RP 1762 and see how you can save money and improve production with Link-Belt screens.

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Bulletin No. 27

DEISTER MACHINE CO.

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1. These machines combine digging, hauling and dumping into one straight-line operation.
2. They handle any class of material with facility.
3. They move a given yardage in shorter time than any other machine of equal cost.
4. They require but a single operator.
5. Power requirements are light.
6. Maintenance costs are moderate.
7. Original equipment cost is lower than any comparable machine.

Available in any capacities 10 to 1000 cu. yds. per hour over 100 to 1500 ft. spans.

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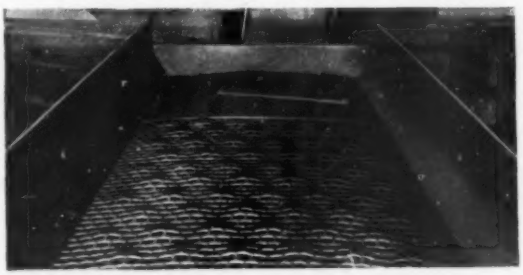

No other screening medium for shaking or vibrating screens offers the variety of openings available in Hendrick Perforated Plate . . . round . . . square . . . hexagonal . . . slotted . . . "Squaround" or special openings. Furthermore, Hendrick Perforated Plate is obtainable in double corrugations, flat or rolled to any diameter, and in a variety of metals, particularly Hendrick High Carbon Heat Treated Steel.

Write for complete data on the advantages of Hendrick Perforated Plate for vibrating or shaking screens.

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Bulletin 1606 entitled Blaw-Knox Buckets for Contractors shows how to select a bucket to secure the profitable difference between peak and ordinary performance—it will be sent on request.

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REHANDLING BUCKETS

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of November 9:

Central

63865. **Slag, crushed or crushed commercial** (other than granulated), in open top cars, C. L. Establish on, from Hamilton, O., to Tiffin, O., 149c per net ton.

63866 (a). **Sand,** industrial, in all kinds of equipment; **sand** (except industrial), in closed equipment; (b) **sand** (except industrial), in open top equipment; C. L. —Establish on, from Hamilton and Overpeck, O., to Wheeling, W. Va., (a) 220c and (b) 204c per net ton.

63870. **Rip rap and breakwater stone,** C. L. (See Note 3). Establish on, from Bedford, Ind., dist. to Jeffersonville, Ind., 110c per net ton.

63990 (a). **Sand** (except industrial), in open top equipment without tarpaulin or other protective covering, C. L.; (b) **sand** (except industrial), in closed equipment, C. L. Establish on, from West Ellwood Jct., Penn., to Glenshaw, Penn., (a) 110c and (b) 121c per net ton.

64020. **Limestone,** ground or pulverized, in bulk, or in bulk in bags, straight or mixed C. L., min. wt. 60,000 lb. Establish on, from Bloomington, Ind., to Gibson City, Ill., 193c per net ton.

64065. **Crushed stone,** in open top cars. Establish on, Woodville and Gibsonburg, O., to Cassell, O., 149c net ton.

64092. **Dolomite, roasted** (refractory dolomite in granular form, treated or untreated, clinkered or burned to a dead state). Establish on, Woodville, Gibsonburg, Bettsville, Millersville and Maple Grove, O., to Alloy, W. Va., 248c net ton.

64136 (2). **Sand** (except industrial) and **gravel,** in open-top cars, C. L. Establish on, from Clyde, W. Va., to the following West Virginia stations: Anjean, 121; Belle, 66; Burdetts Creek, 110; Bridge, 88; Glasgow, 77; Hitop, 77; Hump Charleston, 66; Dondale, 121; Gauley Mountain Mine, 12; Large Creek, 88; Abney, 143; Baileysville, 154; Bud, 143; Carlisle, 121; Cranberry, 154; Eccles, 121; Elmore, 132; Leslie, 121; Lyon, 88; Marting, 77; Nallen, 110; Pentacre, 66; Point Pleasant, 99; Raymond City, 77; Rupert, 121; Russellville, 110; Francis, 143; Gilbert, 154; Glen White, 121; Hamilton, 110; Hotchkiss, 132; Huff Creek Jct., 154; Lego, 143; Lick Fork, 110; Lynco, 154; Maben, 132; Mead, 143; Mullens, 132; Oak Hill, 110; Oceana, 154; Otsego, 132; Pax, 121; Cepece, 121; Macdonald, 121; Ameagle, 110; Boxley, 99; Chesapeake, 88; Elkridge No. 3, 110; Glen Morgan, 132; Greendale, 121; Kayford, 99; Keely, 99; Pickskin, 143; Polk Gap, 132; Princeton, 154; Robson, 110; Silver Gap, 110; Skelton, 154; Sprague, 154; Stahl, 110; Sullivan, 143; Surveyor, 121; Mt. Hope, 121; Tamroy, 121; Layland, 132; Lookout, 121;Marfork, 110; Minden No. 3 and 4, 121; Morris Creek, 99; Nuttall, 110; Scarbro, 121; Viscova, 132.

64137 (2). **Sand,** all kinds, C. L. Establish on, from Goston and Bremen, O., to Mineral Ridge, O., 149c per net ton.

64216. **Crushed stone,** in bulk, in open top cars; and **sand** (except industrial) and **gravel,** in open top cars, C. L. Establish on, from Logansport and Kenneth, Ind., to Liberty Mills, Ind., 49c per net ton.

64231. **Agricultural limestone,** unburned (not ground or pulverized) in bulk, in open top cars only, C. L. Establish on, from Narlo, O., to Dover, New Philadelphia, Parral and Strasburg, O., 127c per net ton via usual available routes.

64296 (a). **Limestone, agricultural,** unburnt, in bulk, in open top cars, C. L., (b) limestone, agricultural (ground or pulverized) unburnt, C. L., min. wt. 50,000 lb. Establish on, from Findlay, O., to Chardon, O., (a) 149c, and (b) 165c per net ton, via B. & O. R. R.

64303. **Limestone, agricultural,** unburnt, in box cars, C. L., min. wt. 50,000 lb. Establish on, from Findlay, O., to Mantua, O., 154c per net ton.

64328. **Limestone,** ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from Mosher, Mo., to Owens, W. Va., 325c per net ton, via M. I.-B. & O.-Cincinnati, O.-C. & O.

64330. **Lime,** common hydrated, quick or slaked, C. L., in bags, barrels, casks, iron drums, or in bulk. Establish on, from Mosher and Ste. Genevieve, Mo., to Troy, O., 20c, min. wt. 30,000 lb., and 14c, min. wt. 50,000 lb.

64336. **Limestone, agricultural** (ground or pulverized), unburnt, C. L., min. wt. 50,000 lb., in box cars. Establish on, from Findlay, O., to Watheys, O., 165c per net ton, via N. Y. C. R. R. (W) direct.

64386. **Crushed stone,** in bulk, in open top cars and **crushed stone screenings and tailings** (other than ground or pulverized agricultural limestone), in open top cars, C. L. Establish on, from Bellevue, O., to Lore City, Gibson, Salesville, Quaker City, Senecaville and Cumberland, O., 149c per net ton.

64387. **Limestone, ground or pulverized,** unburnt, C. L., min. wt. 60,000 lb. Establish on, from Piqua, O., to C. & O. Ry. destinations in the state of Ky., viz.: Maysville, 182c; Vanceburg, 193c; Poplar, 215c; Princess, 204c; Hitchins, Leon, Olive Hill, Soldier, 215c; Morehead, Bluestone, 226c; Mt. Sterling, 237c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason. No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

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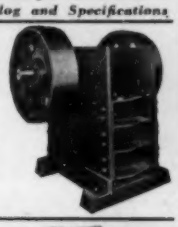

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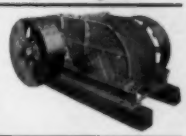

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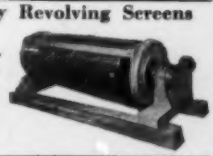

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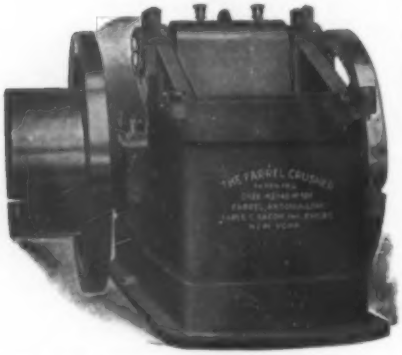
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64448 (2). **Limestone**, ground or pulverized, unburnt, in straight or mixed C. L., min. wt. 60,000 lb. Establish on, from Greencastle, Ind., to consuming points in state of Wisconsin as follows: Jefferson Jct., 248c; Beloit, 237c; Janesville, 237c; Madison, 259c; Dodgeville, 270c; Fennimore, 292c; Prairie Du Chien, 303c; LaCrosse, 314c; Green Bay, 281c; Clintonville, 292c; Marshfield, 314c; Merrillan, 314c; Marinette, 303c; Superior, 391c; Eau Claire, 336c; Bayfield, 391c; Hudson, 358c; Land O' Lakes, 347c.

64482. **Sand** as per descriptions a, b and c, Item 200, C. F. A. L. Trf. 575-A. Establish on, from Ottawa, Ill., Dist. to East Ithaca, N. Y., a, 407c; b, 448c; c, 407c per net ton.

64498. **Limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from Quincy, Marblehead, Ill., and Hannibal, Mo., to Owens and Charleston, W. Va., 391c per net ton.

64519. **Limestone**, crude, in open top cars, C. L., actual wt. will apply. Establish on, from Lewisburg, O., to Decatur, Ind., 116c per net ton.

64520. **Stone, fluxing, furnace or foundry, melting or refractory** (unburned), in bulk, C. L. Establish on, from Lewisburg, O., to Ft. Wayne, Ind., 145c; Muncie, Ind., 124c; Lima, O., 132c; Hamilton, O., 84c; Marion, Bucyrus, O., 132c; Maple Grove, O., 139c; Galion, Mansfield, O., 132c; Barberton, Massillon, Canton, O., 139c; Huntington, W. Va., 183c per gross ton.

64521. **Stone, fluxing, furnace, or foundry, melting or refractory** (unburned) in bulk. Establish on, from Lewisburg, O., to Ashland, Ky., 123c; Portsmouth, Jackson, and Wellston, O., 92c per gross ton.

64537. **Slag**, crushed in open top cars, C. L. Establish on, from Glen Ferris, W. Va., to Clarksburg, W. Va., 176c per net ton.

64547. **Lime**, common, hydrated, quick or slaked, in bags, barrels, casks, iron drums, or in bulk, C. L. Establish on, from Hannibal, Mo., Marblehead and Quincy, Ill., to Wooster, O., 23c, min. wt. 30,000 lb., 19c, min. wt. 50,000 lb., to apply via Routes 701, 703, 705, 716, 2711 and 2729, shown in CFAL Trf. 516-G.

64562. **Stone**, crushed, also **limestone**, agricultural (not ground or pulverized), in bulk in open top cars only, C. L. (See Note 3). Establish on, from LaGro, Ind., to Tiffin, O., 138c per net ton.

Trunk

38068 (Sup. 4). Amend Supplement 2 tonville, Tenn., A 396, B 317; Tullahoma, Tenn., A 363, B 290; Milan, Tenn., A 374, 352; Newport, Tenn., A 396, B 317; Tip-B 299; Mountain City, Tenn., A 440, B 45c per net ton.

39204 (increase). Cancel commodity rates of 473c per net ton on **sand and gravel**, C. L., from Baltimore, Md., to Ogdensburg, Norwood, Plumbrook, and Massena, N. Y., as published in W. Md. Ry. Tariff I. C. C. No. 8609 (See Note 4).

39245. **Sand** (other than industrial) and gravel in open top cars without tarpaulin or other protective covering, C. L. (See Note 3), from Bethlehem, Penn., to Phillipsburg, N. J., 88c per net ton in lieu of current 6th class rate of 10c per 100 lb. (See Note 5).

39298. **Rip rap or rubble stone**, C. L., (See Note 3), to P. R. S. L. stations Swedesboro, Harrisonville, Woodstown and Wenonah, N. J., from Kingston, N. J., 154c and from Lambertville, N. J., 143c per net ton in lieu of current 6th class rate (See Note 5).

39308. **Sand, common or building (not blast, engine, fire, foundry, molding or silica sand), and gravel**, C. L. (See Note 3), from Boonville, N. Y., to Hornell, N. Y., 209c per net ton in lieu of current 6th class rate of 480c per net ton (See Note 5).

39314. **Stone chips or granules (roofing granules) or stone chips** or **granules (other than marble chips)**, C. L., min. wt. 50,000 lb., from Gladhill, Penn., to Chester, W. Va., 352c per net ton (See Note 5).

46702. **Limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb. Establish on, from Quincy, Marblehead, Ill., and Hannibal, Mo., to Baltimore, Md., 545c; Harrisonburg, Va., 523c; New York, N. Y., 611c; Philadelphia, Pa., 567c; Washington, D. C., 523c per net ton.

Southern

23646. Establish 66c net ton on **gravel**, C. L., from Sun, La., to New Orleans, La., and 32c net ton on **sand and gravel**, C. L., from Sun, La., to Slidell, La. Rate to Slidell, La., to apply only on business for movement beyond Slidell by water.

23665 (carrier). **Phosphate rock**, not acidulated (acid phosphate) nor ammoniated, and limestone phosphatic, C. L. Establish 375c net ton, N. C. & St. L. Ry. producing points to Greenville, Tenn.

23718. **Gypsum**, crude or crushed (not ground), in bulk, C. L., min. 80,000 lb. Establish 320c net ton—Plasterco, Va., and Saltville, Va., to Roanoke Rapids, N. C.

23721. **Sand and gravel**, C. L. Establish 60c net ton, Berrylum, Ala., to Mobile, Ala. Water competitive.

23775. **Phosphate rock and phosphatic limestone**, C. L. Establish 663c net ton, Mt. Pleasant-Centreville, Tenn., district to Brantford, Ont.

23960. **Stone, crushed, broken, or rip-rap**, C. L. Establish point to point rate 190c net ton, Camak and Lithonia, Ga., to Port St. Joe, Fla.

23988. **Crude phosphate rock**, C. L. Establish 350c gross ton from origins named

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23995. Establish 132c on phosphate rock and 106c net ton on phosphate rock sinter, C. L., L. & N., Mt. Pleasant, Tenn., district to Sheffield, Ala.

Southwestern

21205. Crushed stone. To establish the following rates in cents per ton of 2,000 lb. on C. L., from Stringtown, Okla., to Paris, Tex., 88; Ragland, Tex., 101; Mayer and Pattonville, 106.

21350. Mica, crude, scrap, ground. Establish commodity rates, C. L., min. wt. 60,000 lb., to Dallas, Tex., of 500c a ton of 2000 lb., from Canon City, Echo, Golden and Texas Creek, Colo., and of 525c per ton of 2000 lb., from Salida, Colo.

21454. Moulding sand, Piggott, Ark., to Alton, Edwardsville, Belleville, O'Fallon and Federal, Ill. Establish rate of 178c per ton of 2000 lb., C. L., from Piggott, Ark., to Alton, Edwardsville, Belleville, O'Fallon and Federal, Ill.

21471. Moulding sand, Piggott, Ark., to W. T. L. territory. Establish rates. C. L., from Piggott, Ark., to points in Michigan and Wisconsin based 110 percent of the industrial sand scale plussed 35c.

The destinations to which rates are proposed are the points to which rates are provided on industrial sand from producing points in Illinois, viz.; Arenzville and Gladstone, in C. B. & Q. Tariff 18965-B.

21531. Crude silica sand. Establish rate of 391c per ton on crude silica sand from Hot Springs, Ark., to Chicago, Ill.

21546. Sand, molding, Piggott, Ark., to Centralia and Mt. Vernon, Ill. To establish rate of 180c per ton of 2000 lb. on molding sand, C. L. (See Note 3). When carrier cannot furnish a car of the capacity ordered by shipper and for its own convenience furnishes a car of greater capacity than the one ordered, the car furnished will be used on basis of the minimum carload weight specified as applicable on car of size ordered. In no case will orders be accepted for cars of less than 80,000 lb. marked capacity.

21593 (1). Crushed stone, Oklahoma to Texas. To add the Paris and Mt. Pleasant R. R. in each of the destination columns of Item 1210 of SWL Tariff 162-O, so that the Paris and Mt. Pleasant R. R. may be placed on a parity with other Texas Lines.

21631. Silica sand, Everton, Ark., to Sand Springs and Sapulpa, Okla. Establish rate of 168c per ton of 2000 lb. on silica sand, in box cars, C. L., min. wt. as provided in Item 60 of S. W. L. Tariff 162-O, I. C. C. 3217, from Everton, Ark., to Sand Springs and Sapulpa, Okla.

21941. Silica sand and rock, Everton, Ark., to Rogers, Ark. Establish rate of 80c per ton of 2000 lb. on silica sand, crude and crude silica rock in box cars, straight or mixed C. L., min. wt. as provided in Item 60, S. W. L. Tariff 162-O, from Everton, Ark., to Rogers, Ark.

22019. Fluorspar. Establish the following rates in cents per ton of 2000 lb., C. L., min. wt. 50,000 lb., to Ada, Blackwell, Bristow, Henryetta, Muskogee, Okmulgee, Poteau, Sand Springs and Tulsa, Okla., also Ft. Smith and South Ft. Smith, Ark., from: Canon City, Texas Creek and intermediate points, 506c; Buena Vista, Riverside and Salida, Colo., 561c.

Texas-Louisiana

5340. Gravel and crushed stone. Establish rates in cents per ton of 2000 lb. on gravel, C. L., as provided in Texas Lines' Tariff 84-C as follows: To Houston, 145; Beaumont, 153; Port Arthur, 183.

Note—On crushed stone and gravel (other than road gravel) the following to apply: "Rate referring hereto applies only on gravel and/or crushed stone to be used in concrete paving work. Regular standard rates will be assessed upon delivery of the gravel and/or crushed stone at Houston and, after the same has been used in concrete paving work, upon presentation to the delivering carrier by the consignee of an affidavit executed by the consignee and to the effect that the gravel and/or crushed stone has been so used, refund will be made by the carrier based on the difference between the regular standard rate and the rate named above."

Industrial Sand Rates in Pennsylvania

A PROPOSAL that the I.C.C. find state-compelled rates on industrial sand from Polk and Utica, Penn., unjustly discriminatory against interstate commerce has been made by the examiner in report No. 28150. The rates proposed for condemnation apply for distances of 200 miles and less in western Pennsylvania on industrial sand (other than naturally bonded), moving in open-top cars, over through routes in joint-line hauls. In accordance with the Commission's practice in such cases, the examiner said it should leave the matter of adjusting the intrastate rates to conform to the proposed findings to the respondent railroads and the Pennsylvania commission.

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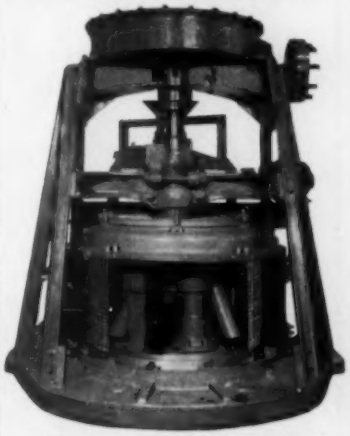

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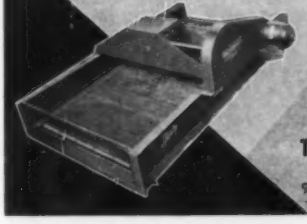

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TOLEDO, OHIO: County commissioners bought 2696 ft. of reinforced pipe from the Toledo Concrete Pipe Co. on its low bid of $2127.40, or a fraction under 79c per ft.

•

GAFFNEY, S. C.: Cherokee county farmers now have the option of obtaining agricultural limestone as a grant-of-aid at a deduction rate of $2.25 per ton, delivered at the farm in lots of five tons or more, or a deduction rate of $1.25 at the quarry of the Campbell Limestone Co.

•

ASHTABULA, OHIO: Northeast Materials Co. has been awarded contract for approximately 2200 tons of sand at a price of 40c a ton at the pit.

•

OKLAHOMA CITY, OKLA.: Low bidders were awarded contracts for materials to be used in the county's highway construction and maintenance program. Southern Rock Asphalt Co. was low with an offer of $5.25 a ton for rock asphalt and $4.45 a ton for premixed asphalt; Midwest Materials Co. bid $1.45 a ton for gravel; Makins Sand & Gravel Co. submitted a low bid on concrete sand, 80c a ton in C.L. lots or 40c a ton at the plant; and Dolese Brothers Co. was low on concrete rock with a bid of $1.40 a ton.

•

WENATCHEE, WASH.: Standard Sand and Gravel Co. was awarded a contract to furnish Chelan county 8500 cu. yd. of gravel at 84c per ton.

New Incorporations

American Concrete Pipe Corp., Union City, N. J., has been granted a charter with a capital of 500 shares, no par value. Agent is Eugene De Tone.

Breakwater Quarries, Inc., Groton, Mass., has been granted a charter. Capital stock will be $50,000 divided into 500 shares of $100 each. The concern is to commence business with $10,000, and incorporators are Napoleon Blake King and Louis C. Wool, both of New London; and Carl Oscar Addison of Upper Derby, Penn.

Asphaltic Rock, Inc., Columbus, Ohio, has been granted a charter to deal in rock and various concrete products. The charter calls for issuance of 600 shares—500 common and 100 preferred—at $100 per share, with $500 to begin business. Incorporators are Ed C. Patton, Edwin Judy and Roy K. Paxson. Agent is Edwin Judy, 26 Wilson Ave.

Iron & Steel Products, Inc., Chicago, announce that Irvin A. Ruder is now managing the merchant iron and steel portion of their business.

Dunham-Hill Concrete Co., Orlando, Fla., has been incorporated with a capital of 100 shares, no par value. Directors are C. M. Dunham, J. B. Hill, and M. S. Horrell.

Gann Sand and Gravel Co., Inc., Alington, Tex., has been granted a charter. Capital stock is $50,000 and incorporators are H. P. Gann, E. A. Gann and Thomas G. Pollard.

Yazoo-Tennessee Gravel Co., with offices at 333 Sterick Bldg., Memphis, Tenn., has been incorporated. Capital stock is 100 shares, no par value, and initial capital is $1000. Incorporators are James H. Whigham, Charles M. Bryan and Blan R. Maxwell.

Manufacturers' News Notes

General Electric Co., Schenectady, N. Y., announces the appointment of Forman H. Craton as head of the Industrial Haulage Section of the transportation department. He joined the company in 1924 after graduation from Syracuse University with the degree of mechanical engineer.

Taylor-Wharton Iron and Steel Co., Easton, Penn., has appointed Wilbur R. Varney as metallurgist to succeed Roy A. Gezelius.

Allis-Chalmers Manufacturing Co., Milwaukee, announces the election of W. C. Buchanan as a member of the board of directors. He is president of Globe Steel Tubes Co., Milwaukee.

John A. Roebling's Sons Co., Trenton, N. J., has appointed Roger H. Clapp, formerly Philadelphia branch manager, as assistant general manager of sales and Earl N. Graf, former manager of the Pittsburgh branch, as assistant manager of sales of its wire rope division.

Consolidated Products Co., Inc., New York City, tendered a testimonial dinner to B. M. Todd at the Newark Athletic Club, October 10. Mr. Todd retired after 21 years of service.

Marmon-Herrington Co., Inc., Indianapolis, Ind., has added George H. Freers to its engineering staff. The capacity of the company's plant is being doubled by a new building program.

Wickwire Spencer Steel Corp., New York, reports the death of Paul M. Macklin, vice-president and general manager recently.

Claude B. Schneible Co., Chicago, has appointed C. C. Hermann as chief engineer. Since 1937 he has been in charge of the company's Philadelphia office as sales engineer.

Hewitt Rubber Corp., Buffalo, recently celebrated the completion of a plant wide expansion and improvement program by holding open house for its employes and their families. Included in the expansion was erection of a new three-story warehouse and primary department.

Cleveland Wire Cloth & Manufacturing Co., Cleveland, reports that Edward T. Butler, vice-president, passed away recently.

Walsh Refractories Corp., St. Louis, has moved its general offices to new and larger quarters at 4070 North First Street.

Timken Roller Bearing Co., Canton, Ohio, reports that Dr. Claude L. Clark, formerly of the department of engineering research of the University of Michigan, has joined the metallurgical staff of its steel and tube division.

Babcock & Wilcox Tube Co., New York City, has transferred Harvey Wilson, formerly in charge of the Philadelphia sales office, to New York, in charge of its New York office territory as district sales manager. He will also have jurisdiction over the Philadelphia office but will be succeeded there by R. M. Lackner, whose successor at Detroit will be B. F. W. Seaburn.

"PENNSYLVANIA" REVERSIBLE HAMMERMILL

preparing 42" Gyratory's output of hard Limestone to size required for the efficient performance of modern Grinding Equipment.

Major crushing by smashing impact,—Automatic Hammer Turning and Resharpening,—Lower Power Demand,—and Sharply cut upkeep cost.

Send for Bulletin No. 1030.

PENNSYLVANIA CRUSHER COMPANY

Liberty Trust Bldg.
PHILADELPHIA, PA.

PUT YOUR REDUCTION PROBLEMS UP TO US

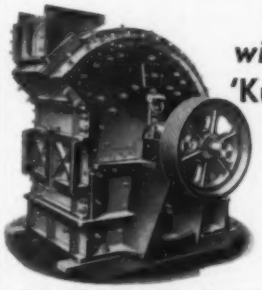
RYERSON CERTIFIED STEELS

LARGE STOCKS...IMMEDIATE SHIPMENT

Principal products include—Alloy Steels, Tool Steels, Stainless Steel, Hot Rolled Bars, Hoops and Bands, Beams and Heavy Structurals, Channels, Angles, Tees and Zees, Plates, Sheets, Cold Finished Shafting and Screw Stock, Strip Steel, Flat Wire, Boiler Tubes, Mechanical Tubing, Rivets, Bolts, etc. Write for Stock List. Joseph T. Ryerson & Son, Inc. Plants at Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

PRODUCE BETTER AGGREGATE AT LOWER COST

with the Cedarapids 'Kubit' Impact Breaker



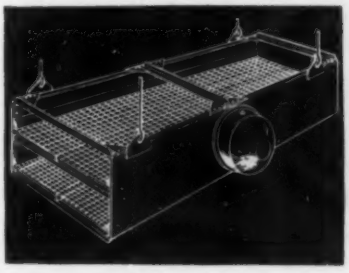
- REDUCES PERCENTAGE OF ELONGATED PIECES.
- PRODUCES ALMOST 100% FRACTURED MATERIAL.
- MAKES SMALLER SIZES WITH LESS WASTE.
- PRODUCES A BETTER GRADATION OF AGGREGATES

Licensed Under U. S. Patent No. 1996485

IOWA MFG. CO.

Write for Bulletin K-1

CEDAR RAPIDS, IOWA



GYROSET VIBRATING SCREEN

1. Adjustable Stroke
2. Oil Lubricated
3. Full Floating Shaft
4. Sturdy Construction
5. Low Cost—Efficient—Economical

Write for Bulletin No. 939

PRODUCTIVE EQUIPMENT CORP.

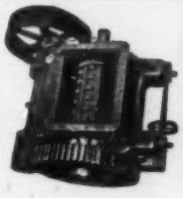
2926-2928 West Lake St., Chicago, Illinois

HAYWARD BUCKETS

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four—clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD COMPANY
202-204 Fulton Street
New York, N. Y.



McLANAHAN EQUIPMENT

CRUSHERS

Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

SCREENS

Complete portable, semi-portable and stationary crushing, screening, and washing plants for different capacities of any materials.

McLanahan & Stone Corp.

Established 1835
HOLLIDAYSBURG, PENNSYLVANIA

PERFORATED METAL SAND AND GRAVEL SCREENS

Manufactured exactly to your specifications

Any size or style screen, in thickness of steel wanted with any size perforation desired.

We can promptly duplicate your present screens at lowest prices

CHICAGO PERFORATING CO.
2437 West 24th Place
CHICAGO, ILLINOIS
Canal 1459

PIONEER offers a complete line of *STANDARDIZED UNITS* for the producer who wants to increase capacity — modernize his equipment — or build a new plant designed to answer his problem.

PIONEER

PIONEER ENGINEERING WORKS · MINNEAPOLIS, MINN.

Classified Advertisements

IMMEDIATE DELIVERY IS IMPORTANT TODAY!

BELT CONVEYORS

1—120' c/c. 36" Stephens-Adamson, anti-friction idlers.
1—120" c/c 18" Barber-Greene, steel framework.
2—Barber-Greene 24", on steel framework, one 126' long, the other 150' long.

AIR COMPRESSORS

4—700 CFM Actual Delivery Worthington Type V-6, 100 lb. pressure, each Twin Unit with 200 H.P. 3/60/440 volt motor direct connected. Now in service and will be released in two weeks.
2—700 CFM Ingersoll-Rand No. 90-CH 2-stage, air cooled, including motor, 1939.
2—Sullivan Type WN-102, two stage, 550', new 1939.
2—Ingersoll-Rand 830 cu. ft. air cooled, electric driven, 100 lbs., 1939.
1—Chicago Pneumatic OCE 20x12x14; synchronous motor.

SHOVELS AND CRANES

3—50B Steam Shovels, 1¾ yd., Shop No's. 4330, 4688, 5042.
1—Marion No. 450 all-electric, 1¼ yd. Caterpillar Shovel.
1—2 yd. Lima, Model 850, with Caterpillar Diesel D-17000 Engine, 1937.
1—2 yd. Marion, Model 281 Comb. Shovel and Crane, Buda Diesel, 1937.
1—Northwest 2¼ yd. Diesel driven Shovel, full revolving, 1937.
1—Bucyrus-Erie 2 yd. 50-B steam driven Dragline Crane and Shovel, aluminum dragline boom and little used shovel front.
1—Truck Crane "Universal" 7½ ton.

CENTRIFUGAL AIR SEPARATORS

10' Sturtevant; 8', 10', 12' Gayco; 6' Raymond; also 5' dia. Raymond "Whizzer" for attachment to roller mill.

LOCOMOTIVE CRANES

1—20 ton Link-Belt 8-wheel std. ga. double drum; 50 ft. boom, Massachusetts boiler; cast steel side frames on trucks.
1—35 ton Link-Belt, 8-wheel, std. ga.
1—50 ton Industrial Type K, 8-wheel.

RAYMOND PULVERIZERS

2 roll and 3 roll High Side—4 and 5 roll Low Side; No.'s 0000, 00, 1 and 3, Beater type—Also No.'s. 55, 60, 90 Imp type, also No. 40 Imp with 6' Centrifugal Separator.

HARDINGE CONICAL BALL MILLS

3'x8", 5'x22", 6'x22", 7'x22", 8'x30", 8'x72".

ROTARY KILNS

9'x160', 8'x150', 3'x125', 8'x100', 6'x120', 6'x60'.

ROTARY DRYERS—Direct Heat

Ruggles-Coles, double shell; 5'x26', 5'x30', 5'6x60', 80"x45', 104"x60', 104"x85'. Single Shell; 4'x30', 5'x30', 6'x40', 6'x50', 6'x60', 8'x60', 8'8"x85'.

BALL, ROD AND TUBE MILLS

Ball Mills: 3'x5', 5'x10', 6'x6', 6'x8'.
Rod Mills: 4'x8', 6'x12' Hardinge, straight side; 5'x10', 5'x12' Allis-Chalmers.
Tube Mills; 3'x12', 4'x18', 5'x20', 5'x35'.

VIBRATING SCREENS

Allis-Chalmers 5'x10', 3 deck; Stephen-Adamson 4'x8', 2 deck; Tyler Hummer 3'x5', 4'x5' 1 and 2 decks; 4—4'x7' Leahy, two deck; 4'x8' Huron, 1 deck; 3—4'x7' Jeffrey-Traylor, 2 deck; Symons 4'x10' 4'x12' 5'x10' 2 deck. Also Rotex, Robinson and other makes.

SYMONS CONE CRUSHER

1—7 ft., with fine bowl.

GYRATORY FINISHING CRUSHERS

1'8" and 2'4" Traylor TY; 410-TZ, 4' Traylor; No. 19, 25, 27 and 49 Kennedy.

GYRATORY CRUSHERS

36" Allis-Chalmers Style "N," short shaft; 20" Allis-Chalmers Superior McCully; 42" Gates; 20" Kennedy Gearless; 20" Traylor; 20" Allis-Chalmers Superior McCully; 15" Telsmith; 13" Superior McCully and smaller sizes.

JAW CRUSHERS

48x42 Traylor Bull-dog; 66x36 Traylor; 48x60 Traylor; 36x24 Farrel; 18x36 Farrell; 24x36 Allis-Chalmers; 8x36 Universal Roll Jaw; 18x30 Allis Chalmers and smaller sizes.

CEMENT MILL MACHINERY

We purchased the entire plant of the Castalia Portland Cement Co., Castalia, Ohio, 60 miles from Cleveland. The liquidation is almost finished, but the following are some of the items still available for immediate shipment:

3—Rotary Kilns—8x125', 6x120', 6x60'.
3—Direct Heat Rotary Dryers—4'6 x 50', double shell; 4x60', 6x60'.
2—5x10' Bonnot Ball Mills, steel lining, with motors.
2—5x22' Tube Mills, silex, with motors.
1—8'x30" Hardinge Conical Ball Mill, iron lined, with motor.
2—5x27' Tube Mills, silex, with motors.
3—18 ton Steam Locomotives, Vulcan and Porter, 36" ga.
100—1½ yd. two-way Steel Dump Cars, 36" ga.
1800 Horsepower in Electrical Motors, all 3/60/440 volt; included are 150 H.P. and 200 H.P. Slip Ring Motors, 585 RPM.

CONSOLIDATED PRODUCTS CO., Inc. **15-16-17 Park Row, New York, N. Y.**

Our Shops at Newark, N. J., cover eight acres

BARGAIN PRICES

ON

RUBBER BELTING

TRANSMISSION—CONVEYOR—ELEVATOR

"V" BELTS

FOR

PUMPS—CRUSHERS—PULVERIZERS—ETC.

RUBBER HOSE

FOR

AIR—WATER—STEAM—ETC.

Partial Stock List

NEW AND HEAVY DUTY

Conveyor and Elevator Belting

Quantity	Width	Ply	Top Cover	Bottom Cover	Type
668 Ft.	36"	6	1/8"	1/16"	Conveyor
660 "	30"	6	1/8"	1/16"	"
245 "	26"	5	1/8"	1/16"	"
906 "	24"	5	1/8"	1/32"	"
298 "	24"	4	1/8"	1/16"	"
370 "	22"	8	1/16"	1/16"	Elevator
296 "	22"	8	Friction		"
1455 "	20"	5	1/8"	1/32"	Conveyor
403 "	20"	4	1/8"	1/16"	"
1738 "	18"	4	1/8"	1/32"	"
60 "	18"	8	1/4"	1/16"	Elevator
288 "	18"	6	1/8"	1/16"	"
712 "	18"	4	1/16"	1/16"	Conveyor
1096 "	16"	4	1/8"	1/32"	"
554 "	16"	4	1/16"	1/32"	"
738 "	14"	4	3/32"	1/32"	"
285 "	14"	4	1/8"	1/16"	"
110 "	12"	8	1/8"	1/16"	Elevator
226 "	10"	6	1/16"	1/16"	"

USED BELTING—Good Condition

440 Ft.	48"	8	1/8"	1/16"	
210 "	20"	7	Friction		Elevator

We will cut any of above rolls. Advise desired lengths and widths and we will promptly quote prices. Many other sizes in stock for immediate shipment.

CARLYLE RUBBER CO., Inc.
62 Park Place **New York, N. Y.**

CONCRETE PLANTS—EQUIPMENT

Ready-mixed concrete batching plant, 3 compts., 1000 yds. aggregates, 750 bbls. cement, automatic weigh batcher, full electric or manual control.
Complete concrete batching plant, Blaw Knox, 125 yds., 3 compts., 150 bbls. bulk cement.
Complete concrete batching plant, Blaw Knox, 150 yds., 3 compts., 250 bbls. bulk cement.
Butler 250 bbl. cement bin, electric, interlocking.
100 ton B.K. 3 compt. aggregate bin, weigh batcher.
75 ton B.K. aggregate 2 compt. bin, weigh batcher.
50 ton B.K. 2 compt. aggregate bin.
200 ton rock storage bin, steel, heavy construction.
Fuller Kinyon bulk cement unloader, portable.
Fuller C46 rotary air compressor, electric.
Jaeger Lakewood 2 yd. concrete mixer, electric.
Smith 1 yd. tilting mixer, electric.
Ransome 1 yd. mixer, electric, practically new.
Rex 1 yd. mixer, gas, new 1939.
Conveyor, 24", Barber Greene, 51', gas, new 1939.

BUCKETS—STONE SKIPS

22—Steel stone skips, 2 to 3 yds.
1 yd. heavy duty Blaw K-ex, digging, clamshell.
1¼ yd. heavy duty Blaw Knox, digging, clamshell.
¾ yd. Haiss rehandling, clamshell.
1 yd. Hayward orange peel, 4 leaf.
1 yd. Hayward orange peel, 3 leaf.

SHOVELS—CRANES

2—Marion Diesel shovels, 1—¾ yd. cap.
No. 50 Bucyrus Erie steam shovel, 2 yds. cap.
Marion Model 32 steam shovel, 1¼ yd. cap.
Bucyrus Erie electric tunnel shovel, 1 yd. cap.
Northwest 1 yd. comb. shovel-crane, gas.

TRACTORS

RD-8 Caterpillar, with bulldozer.
RD-7 Caterpillar, with bulldozer.
Allis Chalmers Model 35, with bulldozer.
Caterpillar Model 30, with L.P. bulldozer.

LOCOMOTIVES

Plymouth 24 ton, gas, standard gauge.
2—Whitcomb 4½ ton, gas, standard gauge.
2—Plymouth 20 ton, Diesel, 36" gauge.

CRUSHERS

Gyratory crushers: K.V.S. 20, 27-S, 49; Telsmith 22, RA, 6B; Traylor 8"; McCully 13", 8", 6".
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 15x30, 16x32, 36x48, 48x60.

RICHARD P. WALSH CO.
30 CHURCH STREET **NEW YORK**

1—**American, Double Drum Hoist,** 52 hp. 440 v.
1—**American, Dble. Drum,** Duplex, 90 hp. 440 v.
5—**Williamette, Double Drum,** Duplex, 2—75 hp. 550 v. motors
1—**Williamette 2-drum Yard Hoist,** 75 hp. 550 v.
4—**Williamette Yarding Hoists,** 2-drum, 2-speed, 200 hp. 550 v. 585 R.P.M. motors
5—**Williamette Yarding Hoists,** 2-drum, 2-speed, 300 hp. 550 v. 585 R.P.M. motors
1—**Williamette Incline Hoist,** 750 hp. 2200 volt, mounted, 70-ton steel car, std. ga.
17—**500 kva G.E.** 22000/600 v. 3 ph. **transformers**
3—6-ton **Bald-West.** 30" ga. **Bat. Locomotives**
1—5-ton **G.E.** 20" ga. **Battery Locomotive**
1—4-ton **Jeffrey,** 30" ga. **Bat. Locomotive**
900—30" ga. 20 lb. **Rail Switches,** Wier Points
1—One-yard **Osgood Gas Shovel**
1—20-ton **Ohio Locomotive Crane,** Std. ga.
1—60-ton **Lima Shay Locomotive,** Superheater

PENSACOLA COMPANY
1100 Fourth Street, Berkeley, California

BELT CONVEYORS: 16"x20' and 18"x30' Portables.
800' of 36" And 300' of 30" Belt.
250' of 20" Belt Conveyor Equipment.
150' of 14" Belt Conveyor Equipment.
150 Head and Tail Conveyor Pulleys.
10 Tons of Selected Gears and Pinions.
30" Gravity Roll Conveyors, ¼" spacing.
BUCKET ELEVATORS: 24"x60', 20"x40', 16"x60', and 14"x50'. Open Types on Chain and Belt.
14"x30', 12"x35', 10"x35', 8"x30', 5"x32' and 5"x14' Enclosed Types On Chain and Belt.
20 Tons of Selected Chain and Sprockets.
CRUSHERS: 10x4A, 15x9, 16x9, 18x12, 20x10 and 24x36B Jaw Types.
16x36 Rolls. No. 2 Limepulver. 8" Traylor Gyra.
VIBRATING SCREENS: 15 Hummers with V16 Heads.
120 New 3x5 & 4x5' Tyler "Toncap" Wire Cloth.
3x5' 1-deck Deister "Multirap," V-belt drive.
3x8' 1-deck Link-Belt, Flat Belt Drive.
4x8' 2-deck Robins "Gyrex" type.
4x8' 2-deck Robins "Perfex" Shaking type.
42"x20' Revolving type, on Trunnion.
36"x16' Scrubber & Washer type, on Trunnion.
No. 20 Telsmith Rotary Grizzly.
OTHER EQUIPMENT: 50-ft. Telsmith Sand Tank.
5—43:1 Late Type Motorized Speed Reducers.
8 Centrifugal Water Pumps, Gasoline & Elect.
Gasoline Engines, 3, 7, 15, 25, and 50-hp.
2—30"-g. Mercury Battery Mine Locomotives.
Portable Track, Flat Cars and Locomotives.
16—24"-g. New Side Dump Cars, 1-yard cap.
1-yd. Haiss Clamshell Material Bucket.
¾-yd. Blaw-Knox Clamshell Digging Bucket.
⅛, 1, & 1⅛-yd. cap. Dragline Buckets.

G. A. UNVERZAGT
15 PARK ROW **NEW YORK CITY**

WE BUY FOR CASH DISCARDED CEMENT

BAGS

We Sell Used Burlap and Cotton Bags of Every Description

PEERLESS BAG COMPANY
26 Broadway
NEW YORK **N. Y.**

Wms. No. 7 Mammoth Jr., No. 4 Jumbo & No. 4 Jumbo Jr. mills.
Loco. Cranes—Several good buys—15 to 40 ton cap.
Whirley Crane—L-D 100, 100' boom. Ametican 465.
Overhead Travelling Cranes—AC & DC, misc. spans.
Cranes-Drags.—1½ yd. Link-Belts, Diesel & gas.
Elec. & Diesel Shovels—1¼-1½-2-2½-3 & 3½ yd.
Steel Bins—25-50-60-100 ton. Set 1 yd. scales.
Conveyors—24"x40'-60' & 80'. 24"x50' gas portable.
Shovel boom-sticks-dipper, etc., for P&H ¾ yd.
Internat'l 100 HP & Cat. D-13000 Diesel engines.
JAMES WOOD, 53 W. Jackson Blvd., Chicago, Ill.

"WE BUY, REBUILD, SELL OR RENT"

AIR COMPRESSORS
Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

BINS
9—2 compartment bins; 3—118 ton Blaw Knox; 1—75 ton Butler Y-40; 3—72 ton Blaw Knox; 1—60 ton Butler Y-40; 1—25 ton Blaw Knox portable; 1—20 ton Heltzel portable with Kron dial scale. All above with or without volume or weigh batchers.

BUCKETS
26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.
6—Dragline: 1—1¾ yd. Northwest; 1—1½-yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page.
1—1½ yd. Pioneer Cableway Excavator bucket.
7—Dragscraper: 3—1 yd. Sauerman; 1—1 yd. Green; 1—¾ yd. Garst; 2—½ yd. Garst.

CRANES, DRAGLINES and SHOVELS
1—Link-Belt, K-55, Serial No. 1698, 70′ boom, 2 yd. bucket, also have 2 yd. shovel attachment.
1—Link-Belt, K-45, Speedomatic, Caterpillar Diesel 13000 with 50′ boom and 2 yd. dragline bucket.
1—Bucyrus Erie 1½ yd., 33-B, A.C. electric tunnel shovel.
1—Northwest Model 104, Serial No. 2079, 45′ boom, 1¼ yd. bucket; with 1 yd. shovel attachment.

SPECIAL
1—Blaw-Knox 120 ton lev. cap. 4 compartment steel bin with extra 100 barrel cement compartment dial scale for weighing 1½ yd. batch and separate dial scale for weighing bulk cement, complete with Fairbanks-Morse water weighing device.

1—Industrial Brownhoist Model D.C., 15-ton cap. with 40′ boom.
1—Link-Belt Model K-42, Serial No. 1285, 45′ boom, 1¼ yd. bucket, also 1 yd. trench hoe attachment or 1¼ yd. shovel front.
3—Northwest Model 105, Ser. Nos. 2556, 2653, 1645, 40′ boom, 1 yd. bucket with one shovel attachment.
1—Bucyrus Erie Model 1035, Ser. No. 11034, 50′ boom with 1 yd. bucket.
2—Osgood Heavy Duty, Serial No. 2069 and 2687, 40′ boom, 1 yd. bucket and with 1 yd. shovel attachment.
3—Thew ⅝ yd. Gasoline Shovel with ⅝ yd. shovel front and 40′ crane boom. Serial No. 2687 and No. 2861.
1—P&H, ⅝ yd. Gasoline Crane with 40′ boom. Serial No. 1834.
1—Koehring Model 301, Serial No. 544, 40′ boom ⅝ yd. bucket.
1—Lorain ⅝ yd. shovel, Model 79, close couple ball with reversible dipper teeth, powered by 75 HP 440-60-3 motor.
1—Bucyrus Erie ⅝ yd., Model 1030, combination.
1—Northwest No. 2 crane, new 1937 with 40′ boom.
1—Byers Bearcat Model 27, Serial No. 5289, 20′ boom, ⅛ cl. sw., ⅛ yd. bucket.
1—Erie Steam Crane Shovel with 40′ crane boom, with or without ⅝ yd. shovel front.
1—Universal Model 35, 50′ boom, ½ yd. bucket.
1—Norberg Butler caterpillar mounted tunnel shovel, air driven. Model 110, shop 2168.
1—Conway Mucker type 60, 60 HP, 440-60-3 electric motor with belt boom and bucket.

CRUSHERS
5—Gyratory crushers: 1—No. 5 Allis-Chalmers; 1—No. 5 Austin; 1—No. 5 Gates; 1—No. 3 McCully; 1—No. 0 McCully.
10—Jaw Crushers: 3—15x36″ Universal; 1—15x36″ Cedar Rapids; 1—15x26″ Champion; 1—12x20″ Acme; 2—10x20″ Climax No. 2½; 1—9x16″ Telsmith No. 9A; 1—9x15″ Champion.
1—Set of Allis-Chalmers, smooth type crushing rolls, 42x16″.

DREDGE PUMPS
1—12″ Morris Heavy Duty D. C. to 100 H.P. dbl. cyl. steam engine.
3—Belt Driven: 3—Morris Mang., 1—10″, 1—8″, 1—6″.

HOISTS
1—2 Yd. Thomas 2 speed Class L Cableway excavator hoist with 150 HP electric motor.
1—National 50 HP dragscraper hoist for handling 1 yd. bucket with 50 HP electric or gas power.
1—1 Yd. Cedar Rapids 2 speed dragscraper hoist with 50 HP electric or gas power.
1—1 Yd. Kern variable speed dragscraper hoist powered by 50 HP electric motor.

PNEUMATIC TOOLS
4—Ingersoll-Rand & Gardner Denver Wagon Drills with I-Rx72 or Gardner Denver Mod. 21 Drills and air hoists.
53—Jackhammer drills: I.R. DCR-28 & S-49 and Gardner Denver, Mod. 57 & 11-D.
17—Drifters, column mounted: 7, Sullivan TJ-10; 4—Gardner Denver Mod. 17; 6—I.R. 73.
3—Drill sharpeners: 2—Sullivan late Mod. Class C and Class A; 1—I.R. 50.

PLEASE SEND FOR A COMPLETE STOCK LIST

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA—1506 Race St. Phone: Rittenhouse 4684
CHICAGO—1119 So. Washtenaw Ave. Phone Nevada 2400
PITTSBURGH—P. O. Box 933, Phone Federal 2000

DEPENDABLE BARGAINS

We have for sale complete quarry equipment (of a large public utility) which is being discontinued. This includes—

One—20-ton Howe track scale.
One—50-B three-motor Bucyrus crawler shovel.
One—Link-Belt 8-wheel locomotive crane, 40′ boom, 2 cu. yd. grab bucket electrically operated.
One—10-ton Clyde steel derrick, 70′ boom.
One—Double-drum Clyde electric hoist, with boom swinging attachment.
One—No. 44 Clipper blast well drilling machine.
One—No. 14 Junior electric drilling machine.

Also pumps, compressors, stone skips, crushed stone washing and screening plant complete, 3 Superior McCulley crushers, elevators, etc. Everything priced low to move for cash. Equipment all in excellent mechanical condition.

HUNTER TRACTOR & MACHINERY CO.
325 S. 16TH ST. MILWAUKEE, WIS.

FOR SALE

Bucyrus 50-B Steam Shovel with 26′ Boom, 17′ Stick, 2 Yd. Manganese front Dipper, located Central Illinois.

Osgood 1-Yd. combination Crane/Dragline with 40′ Boom. Also Tunnel Shovel Attachment. Located Near Chicago, Illinois.

Address Box 963, Care of Rock Products, 309 West Jackson Blvd., Chicago, Illinois.

FOR SALE:

One No. 14 Sanderson Cyclone Drill complete with 15 H.P. 440 Volt 3 Phase 60 Cycle Fairbanks Morse Motor.
One No. 14 Sanderson Cyclone Drill complete with 15 H.P. 440 Volt 3 Phase 60 Cycle General Electric Motor.
Thoroughly overhauled and in first-class operating condition—now operating. **Address Box 965, Care of Rock Products, 309 West Jackson Blvd., Chicago, Illinois.**

LOCOMOTIVES SHOVELS — CRANES

Attractive Prices

1—80 Ton American 0-6-0 Switcher.
1—75 Ton Baldwin 0-6-0 Switcher.
2—40 Ton American Saddle Tanks.
1—38 Ton Vulcan Saddle Tank.
1—38 Ton Porter Saddle Tank.
2—25 Ton Plymouth—Gasoline. Standard Gauge—Rebuilt

1—Marion 480 Combination Steam Shovel and Crane.
1—52-B Bucyrus Dragline 70 ft. Boom, Atlas Imperial Diesel Engine.
1—25 Ton Browning 8-C Steam Locomotive Crane.

Birmingham Rail & Locomotive Co.
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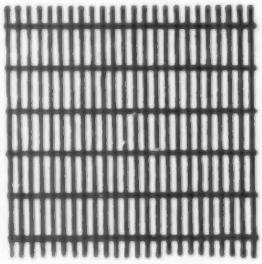

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STAR PERFORMERS

CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY No. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.

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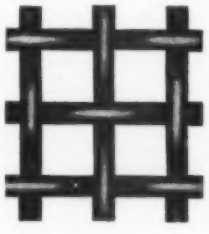


MORE PROFITS FOR YOU

FELLOW CITIZENS!

There are two ways of achieving POTENCY in our NATIONAL ECONOMY, essential to meet the INTERNATIONAL CRISIS, which threatens our mode of life and our most cherished institutions.

One is Coöperation and the other is Coercion. Those who have made the International Crisis are using Coercion. In this country we propose to use Coöperation.

There's a vast difference between the meaning of these two words—just as there is a vast difference between our political inheritance and theirs.

That's why *voluntary* associations have always played a large part in our history. They are essential to maintenance of our liberties because they are natural vehicles of coöperative expression and action.

Fellow citizens who make your livelihood in these industries! It is your duty and it will prove your pleasure and profit to attend the 1941 conventions of your industry.

Silver Anniversary Convention of the **National Sand & Gravel Association**

held in conjunction with Eleventh Annual Convention of

National Ready Mixed Concrete Association

Netherland Plaza Hotel, Cincinnati, Ohio

JANUARY 15, 16, 17, 1941

Twenty-fourth Annual Convention of **National Crushed Stone Association**

Netherland Plaza Hotel, Cincinnati, Ohio

JANUARY 20, 21, 22, 1941

Thirty-Eighth Annual Convention of **American Road Builders Association**

Pennsylvania Hotel, New York City, N. Y.

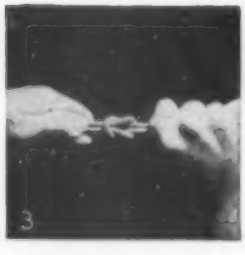
JANUARY 27, 28. 29, 30, 31, 1941

FIRE IT *right*

Primacord is detonated by a fuse-and-cap, or an electric blasting cap. This is the *only* cap required for the entire blast, whether there is one hole, or a thousand. It is attached only *after* all holes have been loaded and tamped — *after* all connections have been made — *after* all equipment and lines have been removed — *after* all men have gone to a place of safety.

The cap detonates the PETN core of Primacord, releasing the powerful wave that travels 3.85 miles per second, detonating every cartridge in the entire blast.

Primacord gives you more profitable blasting — saves time, labor, money. We shall be glad to send you a free copy of the Primacord Booklet.



PRIMACORD·BICKFORD

Detonating FUSE

THE ENSIGN-BICKFORD CO., Simsbury, Conn.

Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

PB28

1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.

IMPORTANT: Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.

AMERICAN CABLE TRU-LAY *Preformed*

Designed for Man and Industry

American Cable engineers took wire rope (a highly standardized product nearly 100 years old) and made a basic improvement in it. They preformed it. That is to say—at the time of its manufacture, every strand and wire is preshaped to the position it assumes in the finished rope instead of merely being twisted and held in place by force. That sounds like a small thing to do—but it wasn't and the results were tremendous. Preforming made a new type of wire rope—a rope capable of giving greatly increased service.

American Cable TRU-LAY, being preformed, is a relaxed, flexible rope. It doesn't fight the men who work with it. It resists kinking and snarling. It doesn't tear workmen's hands or clothing because worn and broken crown wires in TRU-LAY don't wicker out to become vicious jaggers. TRU-LAY is a safer rope. More than this, it has amazing fatigue resistance and so lasts longer —gives better service. Yes, American Cable TRU-LAY Preformed was designed for man and industry.

BUY ACCO QUALITY *whether it is American Cable's Tru-Lay Preformed Wire Rope—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Wright Hoists—Page Wire Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

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WILKES-BARRE, PENNSYLVANIA

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Green Signifies Full Speed Ahead for National Preparedness

AMERICAN CHAIN & CABLE COMPANY, Inc.

Quoted

When you're in the market for any size excavator, check these features carefully; they mean low-cost output for you:

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2 **Transmission**—Does Power move in a straight line? How many anti-friction bearings? How many gears enclosed in oil?

3 **Clutches and Brakes**—Do they give operator **full** control of every function? How about adjustment and maintenance?

4 **Levers**—Are they conveniently grouped, easy to work?

5 **Mounting** — Does it give full mobility? Ample bearing area?

6 **Long Life** — Is it built strong to last, with full provision for easy maintenance?

We'll be glad to show you how any machine in the complete modern Bucyrus-Erie line answers these questions. The answers mean money to you, so it will pay to investigate Bucyrus-Erie — the Repeat Order Machine.

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JUL -0 1941